SAFETY ELEMENT

THOUSAND OAKS GENERAL PLAN

Prepared by:

Rincon Consultants, Inc.
790 East Santa Clara Street, Suite 103
Ventura, California 93001

THOUSAND OAKS GENERAL PLAN

SAFETY ELEMENT

City of Thousand Oaks
Department of Planning and Community Development
2100 Thousand Oaks Boulevard
Thousand Oaks CA 91362

Adopted July 2, 1996

This document supersedes the Safety and Seismic Safety Elements of the Thousand Oaks General Plan as originally adopted in 1974 and as amended to date.

This document is printed on recycled paper.

Table of Contents

List of Figures

List of Plates

List of Tables

1.0 INTRODUCTION

1.1 OVERVIEW

The City of Thousand Oaks has prepared this revised Safety Element of the General Plan in compliance with California State law. This document supersedes both the Seismic Safety Element and Safety Element prepared for the City in 1974 by Leighton and Associates. It complements and is consistent with the goals and policies and other elements that make up the City of Thousand Oaks General Plan.

The adoption or amendment of a general plan is a legislative act. The Safety Element, and all elements of the General Plan, have equal legal status.

The need to update the City of Thousand Oaks Safety Element arose after the Northridge Earthquake in January, 1994. As a result of that event, the City has issued over 850 building permits to repair earthquake damage. City staff determined that an updated Safety Element would assist the City in planning for hazards and responding to disasters by serving the following functions:

- *providing an accurate and updated assessment of the natural and human-related hazards in the Planning Area, including, but not limited to, earthquakes, landslides, subsidence/settlement, inundation, fire, and release of hazardous materials;*
- *providing a framework by which safety considerations are introduced into the land use planning process;*
- *recommending revisions in the development review process, by facilitating the identification and mitigation of hazard;.*
- *providing policies directed at identifying and reducing hazards;*
- *strengthening earthquake, inundation, fire and hazardous materials preparedness specific to Thousand Oaks.*
- *integrating this Element with the City's Emergency Operations Plan to ensure consistency with adopted policies and implementation measures.*

The Safety Element became a mandatory part of the general plan in 1975 when the State Legislature adopted SB 271 (Chapter 1104). The initial legislation focused on the adoption of policies relating to fire safety, flooding, and geologic hazards. In 1984 the State revised the Legislation (AB 2038; Chapter 1009) expanding the list of safety element issues and combining the Safety Element and Seismic Safety Element into a single document. The focus of the Safety Element is to adopt policies that will .. "reduce death, injuries, property damage, and the economic and social dislocation resulting from natural hazards." Although the emphasis is on fire, flooding, geologic, and seismic hazards, other relevant safety issues include emergency preparedness, hazardous materials spills, and critical and lifeline facilities.

Section 65302 (g) of the Government Code Section specifies that:

> *The general plan shall include a] safety element for the protection of the community from any unreasonable risks associated with the effects of seismically induced surface rupture, ground shaking, ground failure, tsunami, seiche, and dam failure; slope instability leading to mudslides and landslides; subsidence and other geologic hazards known to the legislative body; flooding; and wild land and urban fires. The safety element shall include mapping of known seismic and other geologic hazards. It shall also address evacuation routes, peakload water supply requirements, and minimum road widths and clearances around structures, as those items relate to identified fire and geologic hazards.*

Other pertinent sections of the California code pertaining to geologic and seismic hazards include (Government Code Section 65302.5 and Public Resources Code 2697, 2699 and 4102). Sections pertaining to Fire include Public Resources Code 4125 and 4128.5. Copies of these applicable Code sections are included as an Appendix to this document.

1.2 ORGANIZATION OF THE SAFETY ELEMENT AND EXECUTIVE SUMMARY OF RECOMMENDATIONS

The Safety Element is organized into three components. The **Introduction** describes the purpose and scope of the element, and provides a planning context framing the information and recommendations. The **Goals, Policies, and Programs** provides the City of Thousand Oaks policies to plan for hazards and respond to emergency circumstances. The **Technical Background Report** provides the issue-specific data and information that leads to the recommendations. This section is a detailed database which maps and documents geology/seismicity, flooding, fire hazards, and disaster preparedness. All **figures and maps** pertaining to hazard issues are contained within the Technical Background Report.

1.3 RELATION TO OTHER ELEMENTS OF THE GENERAL PLAN

The Safety Element is consistent with the other elements of the General Plan, supporting and complementing the Plan's goals and policies and the related elements . The Land Use Element establishes use and density designations, and controls zoning for all land Citywide. Therefore, the Safety Element informs questions of use and density based on the degree of hazard that may be present. Likewise, the Housing and Conservation and Open Space Elements address lands that may be set aside for certain specific purposes. Decisions regarding the location of multi-family housing, for example, will be better informed when framed within data related to the City's safety hazards and emergency service provision. Open space designations are commonly linked to areas of geologic or flood hazard. The Circulation Element emphasizes transportation issues, which relates to the provision of emergency response in the event of a disaster.

This Safety Element is designed to provide the input necessary to assist the City of Thousand

Oaks in achieving balanced planning decisions. It recognizes the importance of the public safety, and the need to integrate safety concerns with other local issues.

1.4 PLANNING AREA SETTING

The City of Thousand Oaks is situated in the Conejo Valley of eastern Ventura County. The City, which includes the community of Newbury Park and part of the community of Westlake Village, covers about 55 square miles. The City's Planning Area, which includes adjacent unincorporated areas under the City's general planning jurisdiction is slightly larger, at about 60 square miles. The General Plan, including the Safety Element, applies to this larger Planning Area.

The Conejo Valley has distinctive geomorphic features - comprised of mountains, artificial lakes and rolling hills with clearly defined access points to the City. The Valley is about nine miles long and seven miles wide and is situated at an elevation of about 800 feet above sea level. The Valley is rimmed by Mountclef Ridge and the Simi Hills to the north and east, the Santa Monica Mountains to the south, and Conejo Mountain to the west. The developed portions of the City are located primarily on the Conejo Valley floor and on slopes of less than 25% gradient.

Access to the City is primarily via seven major arterials. From the east, entrance to the Valley is via U.S. Route 101 (Ventura Freeway), Thousand Oaks Boulevard, and Agoura Road. From the west, access is via U.S. Route 101 over the Conejo Grade. Access from the north is via State Route 23 (Thousand Oaks Freeway), Moorpark Road and Olsen Road.

The City is an economically balanced community with a diverse tax base. Residential, office and retail commercial, and industrial land uses are carefully planned and located within the City. An extensive open space system supports these land uses and buffers the City from nearby urban areas.

The City provides police protection service to the community by contract with the Ventura County Sheriff's Department. The main police station is located on Olsen Road near the City limits. A "store-front" branch police station is located at 241 Lombard Street. Fire prevention and suppression services are provided within the City and adjacent unincorporated areas by the Ventura County Fire Protection District with stations distributed throughout the community. Water is provided by three water retailers, including the City itself, each with its own service area. The retailers purchase water from Calleguas Municipal Water District which in turn purchases water from the Metropolitan Water District. Bard Reservoir, located northeast of the City, stores much of the water used by the City.

The City is served by one hospital - Los Robles Hospital/ Medical Center (208 bed facility). There are also three urgent care facilities and a walk-in clinic.

2.0 GOALS, POLICIES, AND PROGRAMS

The Safety Element establishes the goals, policies, and programs of the City of Thousand Oaks to protect the community from unreasonable risks associated with the effects of:

- *seismic hazards;*
- *dam failure;*
- *slope instability;*
- *flooding; and*
- *wildland and urban fires.*

It also addresses evacuation routes, emergency preparedness, hazardous materials spills, peak load water supply requirements, and road clearance widths.

The goals are intended to establish direction for an ideal future end condition related to the public heath, safety, or general welfare. In the context of a General Plan, goals are expressions of community values adopted by the City Council to guide the development and implementation of policy. A policy is a specific statement that guides decision-making. It indicates a clear commitment of the City Council. It is based upon the goals, as well as upon the technical background data. Programs are fundamental rules or doctrines guided by the goals and policies. Programs are based on community values, generally-accepted planning practice, and current technology.

The accompanying Technical Background Report provides data and information for the key issue areas including geology/seismicity, flooding, fire hazards, and disaster preparedness. All maps and figures are contained within the Technical Background Report.

2.1 FAULTING/SEISMIC HAZARDS

The City of Thousand Oaks lies in a seismically active area. Although no active faults have been mapped within the city limits, two potentially active faults, the Boney Mountain and Sycamore Canyon faults, traverse parts of the City. Seismically induced ground shaking has affected the City in the past and is expected to affect the City in the future.

Ground shaking caused by the magnitude 6.7 Northridge Earthquake of January 17, 1994 resulted in the single most costly natural disaster in U.S. history. In the City of Thousand Oaks, located about 20 miles from the epicenter, over 850 building permits have been issued by the City to repair earthquake damage.

Based on seismic modeling, the Simi fault, located about one mile north of the Planning Area boundary (see figure 1-5 in Technical Background Report), is anticipated to be capable of generating the highest peak ground accelerations for the City. A maximum credible earthquake of 6.9 on the Simi fault would be capable of generating peak ground accelerations of 0.6 g and

a Modified Mercalli Intensity (MMI) of X (see Table 1-1 in Technical Background Report). Seismic experts believe that within the next 30 years, there is about a 40% chance of peak ground accelerations exceeding 0.2 g for the Thousand Oaks area. This corresponds to a MMI of VIII or greater.

2.1.1 Goals

Minimize the risk of loss of life, injury, damage to property, and economic and social dislocation resulting from fault rupture and seismically induced groundshaking.

2.1.2 Policies and Programs

The following policies/programs will assist the City in meeting the stated goals. The first four are currently required by the City.

1. Require site-specific geologic and engineering investigations as specified in the UBC and Municipal Code for proposed new developments and/or when deemed necessary by the City Engineer and/or through the CEQA process.

2. Adopt new Uniform Building Code (1994) and enforce provisions relating to earthquake resistant design and foundation/grading regulations, respectively.

3. Enforce provisions of Title 7, Chapter 3 (Grading) and Title 8, Chapter 1 (Building Code) of the Municipal Code that incorporate the UBC with amendments specific to the City.

4. Continue to allocate a percentage of building permit fees (as specified in Chapter 8 of Division 2 of the Public Resources Code) to a trust fund (Strong Motion Instrumentation Program Fund) which is remitted to the State of California. The moneys are earmarked for seismic education pursuant to the Seismic Hazards Mapping Act of 1990.

5. Provide setbacks, as determined to be necessary, for any proposed development located on or near an active or potentially active fault. Appropriate setback distances will be determined through engineering geologic investigation. It should be noted that no active faults have been mapped within the Planning Area boundary. Potentially active faults include the Sycamore Canyon and Boney Mountain Faults and the L-1 Lineament (see Plate 1 in Technical Background Report).

6. Continue to review public or privately-owned facilities for compliance with applicable earthquake-related Code provisions.

7. Examine the feasibility and financial implications associated with:

   - *retrofitting of buildings that are undergoing upgrades/repairs in order to withstand major earthquakes;*
   - *installation of automatic gas shutoffs in buildings to reduce fire hazards associated with seismic shaking;*

   Also, pursue financially feasible opportunities to upgrade water, sewer and other utilities as appropriate to withstand seismic shaking.

8. Require all developers and/or subdividers of a parcel or parcels in an area of known fault hazard to record a Notice of Geologic Hazards with the County Recorder describing the hazards on the parcel and the level of prior geologic investigation conducted.

9. Require project modifications, including but not limited to hazard mitigation, project redesign, elimination of building sites, and the delineation of building envelopes, building setbacks and foundation requirements, as deemed necessary, in order to mitigate faulting/seismic hazards.

10. Require that special findings be made for all development permits where potentially hazardous conditions exist indicating how public health and safety is to be protected.

2.2 GEOLOGIC HAZARDS

Due to its hilly topography, land within the City of Thousand Oaks is susceptible to a number of geologic hazards -- primarily landslides, debris flows, mudslides, rockfalls, and expansive soils. All of these hazards have affected the City's planning area to some extent since the mid-1950s, when urbanization increased dramatically. The City is formalizing its planning in light of these potential geohazards especially as development may involve steeper terrain (approaching 25% gradient) as the City nears buildout.

2.2.1 Goals

Safeguard life, limb, health, property, and the public welfare by establishing minimum requirements for regulating grading and procedures by which such requirements may be enforced {Title 7, Chapter 3, Section 1 of the Municipal Code (M.C. 7-3.01)}.

Provide minimum standards to safeguard life or limb, health, property and the public welfare by regulating and controlling the design, construction, quality of materials, use and occupancy, location, demolition, and maintenance of all buildings and structures within the City and certain equipment specifically regulated therein (M.C. 8-1.02).

2.2.2 Policies and Programs

The following policies/programs will assist the City in meeting the stated goals. All of the policies under grading/building construction are currently required by the City.

Grading/Building Construction

1. Require any alteration, grading, excavation or fill activity to comply with the City Grading Ordinance.

2. Require that all construction be in accordance with the most current version of the Uniform Building Code and Title 8, Chapter 1 of the Municipal Code which incorporates the UBC with specific amendments.

3. Perform site-specific geologic and engineering investigations for new developments as specified in the UBC and Municipal Code.

4. Prohibit grading or relocation of earth on land having a natural slope greater than 25% unless approval is obtained from the Planning Commission or City Council and a grading permit has been obtained from the City Engineer (M.C. 7-3.07).

5. Continue to regulate grading during the rainy season (November-April) in order to control erosion and protect life and property from damage due to flooding or erosion associated with grading activities.

Liquefaction

1. Conduct soils investigations to evaluate hazards potential for proposed developments in areas of potential liquefaction.

2. Require project modifications, including but not limited to project redesign, elimination of building sites, building envelopes and drainage and foundation requirements, as necessary in order to mitigate liquefaction hazards.

3. Require the developers and/or subdividers of a parcel or parcels in a Liquefaction Hazard Zone to record a Notice of Geologic Hazards with the County Recorder describing the potential hazards on the parcel and the level of prior geologic investigation conducted unless the condition has been mitigated.

4. Require that special findings be made for all development permits where potentially hazardous conditions exist indicating how public health and safety is to be protected.

Landslides and Debris Flows

1. Require that all development activities provide a setback from potentially unstable areas or from the margins of potential debris flows channels and depositional areas as identified through engineering and geologic studies.

2. Require drainage plans designed to direct runoff away from unstable areas.

3. Where washouts or landslides have occurred on public or private roads, require that road reconstruction meet the conditions of appropriate geologic and engineering reports and provide for adequate engineering supervision.

4. In general, prohibit building sites within the flowline or discharge areas of hillside swales or channels. Building may be able to occur near smaller swales and channels given appropriate mitigation measures.

5. In an area of known slope stability or debris flow hazards, require developers and/or subdividers of a parcel or parcels to record a Notice of Geologic Hazards with the County Recorder describing the potential hazards on the parcel and the level of prior geologic investigation conducted.

6. Require project modifications, including but not limited to hazard mitigation, project redesign, elimination of building sites and development of building and septic system envelopes, building setbacks and foundation and drainage requirements as necessary in order to mitigate landslide and debris flow hazards.

7. Require that special findings be made for all development permits where potentially hazardous conditions exist indicating how public health and safety is to be protected.

Expansive Soils

Items 1 and 2 below are currently being done as part of the plan check process.

1. Require the preparation of a preliminary soils report, prepared by a registered civil engineer and based upon adequate test borings, for every subdivision and every individual lot where expansive soils have been identified.

2. Prohibit the placement of habitable structures or sewage disposal (leach) systems on or in expansive soils unless suitable mitigation measures are incorporated to prevent the adverse effect of these conditions.

3. Require the developers and/or subdividers of a parcel or parcels in an area of known highly expansive soils hazard to record a Notice of Geologic Hazards with the County

Recorder describing the potential hazards on the parcel and the level of prior geologic investigation conducted.

4. Require project modifications, including but not limited to hazard mitigation, project redesign, elimination of building sites, building envelopes and drainage and foundation requirements as necessary in order to mitigate hazards associated with expansive soils.

5. Require that special findings be made for all development permits where potentially hazardous conditions exist indicating how public health and safety is to be protected.

2.3 FLOOD HAZARDS

Certain areas of the Thousand Oaks Planning Area are subject to periodic inundation from flooding which can result in destruction of property and improvements to the property, loss of life, health and safety hazards, and disruption of commerce and governmental services. Encroachment onto floodplains, such as artificial fills and structures, reduces the capacity of the floodplain and increases the height of flood water upstream of the obstructions. Floodplain management involves the balancing of economic gain associated with land development within the floodplain against the increased flood hazard.

Five dams in the Thousand Oaks area have the potential to result in inundation (in the event of a dam failure) to the City or surrounding environs or in a serious disruption of water supply. These include dams at Lake Sherwood, Westlake Lake, Westlake (Las Virgenes) Reservoir, Lake Eleanor, and Wood Ranch (Lake Bard). Failure of any of these dams during a catastrophic event such as an earthquake is considered possible, though unlikely. Failure of Lake Sherwood Dam would cause significant flooding between Lake Sherwood and Westlake Lake, and would cause the level of Westlake Lake to rise several feet. Failure of Lake Eleanor Dam would impact the Westlake Boulevard area to Westlake Lake. Failure of Westlake Reservoir Dam would result in flow into Westlake Lake, potentially expanding the perimeter of the lake by about 1,000 feet.

2.3.1 Goals

Promote the public health, safety and general welfare and to minimize public and private losses due to flood conditions in specific areas (M.C. 4-7.01).

Minimize the risk of loss of life, injury, damage to property, and economic and social dislocations resulting from inundation by dam failure, or from disruption of domestic water supply.

2.3.2 Policies and Programs

1. Restrict or prohibit uses which are dangerous to health, safety and property due to water or erosion hazards, or which result in damage or increases in erosion or flood heights or velocities (M.C. 4-7.01).

2. Require that uses vulnerable to floods, including facilities which serve such uses, be protected against flood damage at the time of initial construction (M.C. 4-7.01).

3. Control the alteration of natural floodplains, stream channels and natural protective barriers which help accommodate or channel floodwaters (M.C. 4-7.01).
4. Control filling, grading, dredging, and other development which may increase flood damage (M.C. 4-7.01).

5. Prevent or regulate the construction of barriers which will unnaturally divert floodwaters or which may increase flood hazards in other areas (M.C. 4-7.01).

6. Locate structures and additions outside of the 100-year floodplain unless such facilities are necessary to serve existing uses and construction of these structures will not increase the hazard to life or property within or adjacent to the floodplain. Location within the floodplain shall be governed by the County Flood Plain Ordinance and Title 4, Chapter 7 of the Thousand Oaks Municipal Code and shall require certification by a registered professional demonstrating that encroachments shall not result in any increase in flood levels during the occurrence of the 100-year flood.

7. Avoid development of new critical facilities within 100-year flood plain areas and dam inundation areas.

8. Comply with provisions of the Master Plan of Drainage for all new development within the City. The City shall update this document as necessary.

9. Implement drainage improvements recommended in the Master Plan of Drainage and follow-up 10-Year Deficiency Study.

10. Construct dams according to high seismic design standards of the Dam Safety Act and as specified by engineering studies.

11. Design and implement a flood warning system for residents living in designated floodplains and dam inundation areas. Special precautions should be taken for critical facilities within these areas [e.g., Westlake Elementary School (dam inundation area), Newbury Park High School and Manzanita Elementary School (100-year flood area)].

12. Update the City's Emergency Operations Plan (Multi-Hazard Function Plan)

periodically to incorporate emergency preparedness procedures.

13. Require the developers and/or subdividers of a parcel or parcels in an area of known flood hazards to record a Notice of Geologic Hazards with the County Recorder describing the hazards on the parcel or parcels and the level of prior hydrologic or geologic investigation conducted.

14. Require project modifications, including but not limited to: hazard mitigation, project redesign, building elimination, development of building and septic system envelopes, and special foundation requirements as deemed necessary in order to mitigate potential flood hazards.

15. Require that special findings be made for all development permits where potentially hazardous conditions exist indicating how public health and safety is to be protected.

2.4 FIRE HAZARDS

The City of Thousand Oaks experiences fires from a number of sources. These include wildland, structural, vehicle, refuse, and human-generated incidents. Wildland fires are a result of a combination of three primary factors: vegetation, climate, and people. The native plant communities of greatest concern include the coastal sage scrub and chaparral that cover the undeveloped hillside areas. These plant communities have evolved to incorporate burning into their ecological cycle. Mediterranean climate characterized by hot dry summers and hot dry winds in the fall turn this vegetation into a major source of fire fuel. These fuel sources are most commonly ignited by man, either directly through careless action or arson, or indirectly through accidents.

Fire prevention and suppression services are provided within the Thousand Oaks Planning Area by the Ventura County Fire Protection District. The Fire Protection District has instituted a number of programs to minimize the potential for hazards including fire safety and fire prevention training, site inspections, and urban/wildland interface hazard mitigation programs.

2.4.1 Goals

Provide minimum standards to protect life, limb, property, safety, and welfare of the citizens of the City by regulating and controlling the hazards of fire and explosion arising from the storage, handling, and use of hazardous substances, materials, and devices and from conditions hazardous to life or property in the use or occupancy of buildings or premises (M.C. 4-6.02).

Prevent the loss of life and property due to uncontrolled wildfire in the urban/wildland interface through the cooperation of the Ventura County Fire Protection District and property owners living in these areas.

2.4.2 Policies and Programs

1. Continue to enforce the following:

    - *California Health and Safety Code, Division 12, Part 2.7 (Fire District Law) and Part 5 (Abatement of Hazardous Weeds and Rubbish);*
    - *Ventura County Fire Protection Ordinance 22 (Adopting the Uniform Fire Code);*
    - *Ventura County Fire Protection District Ordinance 22 (Clarifying the definition of Combustible Material); Uniform Fire Code, Article 11, Division VII, Abatement of Combustible and Flammable Materials; and*
    - *Title 6, Chapter 4 of the of the Municipal Code.*

2. Continue to provide adequate fire protection and prevention services to meet the needs of the community and continue to support interjurisdictional fire protection agreements.

3. Inspect buildings susceptible to fire damage and abate hazardous conditions as necessary.

4. Conduct and encourage fire safety and fire prevention programs for schools and other critical facilities.

5. If it is determined that older fire stations do not meet seismic structural codes, upgrade or replace these facilities as necessary.

6. Continue to strive for 6.5-minute response time to all fire and life safety emergency responses.

7. Provide adequate fire flow for all new developments in accordance with the 1994 Uniform Fire Code, Appendix III-A and adopted Amendments (or the most current edition of the Uniform Fire Code as adopted).

8. Equip proposed structures greater than 5,000 square feet in area with an automatic fire sprinkler system in accordance with Ventura County Ordinance No. 22, Appendix VII.

9. Continue to upgrade existing developments with deficient fire flows -- such as the Rolling Oaks Ranch Tract (unincorporated area) which has fire flows of only about 300 gpm.

10. Provide for minimum road widths and clearances for new development projects in accordance with:

    - *Municipal Code requirements (M.C. 9-3.1015 and 9-3.1016);*
    - *standards specified in the City of Thousand Oaks Road Standards and construction*

specifications in effect at the time of construction (Ord. 744-NS, eff. April 17, 1980); and
- *any other standard and specific Planning Conditions required by the Fire Department in the permit application.*

11. Ensure that streets within the Hillside Planned Development zone are designed with right-of-way, roadway, and median widths conforming to the specified standards in Section 9-4.3108 of the Municipal Code.

12. Establish defensive barriers in the urban/wildland interface to protect against wildfire. Specifically this shall include:

    - *Establish and maintain a 100 foot defensible perimeter around each habitable structure along the urban wildland interface.*
    - *Provide for the removal of annual fuels within the defensive perimeter.*
    - *Provide any fire suppression resource from any agency the opportunity to successfully protect structures and other valuable properties during a wildfire threat.*
    - *Protect the watershed fire areas from exposure to structure fires in the urban/wildland interface areas.*

13. Discourage the location of public facilities and above-ground utilities in extreme fire hazard areas. When unavoidable, special precautions should be taken to minimize potential impacts.

14. Encourage public participation in arson prevention programs.

15. Require that special findings be made for all development permits where potentially hazardous conditions exist indicating how public health and safety is to be protected.

16. Require that all construction be in accordance with the most current version of the Uniform Building Code as adopted by the City of Thousand Oaks.

17. Implement appropriate fuel management and prescribed burning programs on a selective basis in order to reduce the potential for devastating wildfires and the resulting damage they cause to both natural ecosystems and urban environments.

18. Coordinate with Ventura County Fire Protection District Managers as determined to be necessary in order to identify suitable fuel management and prescribed burning areas.

19. Review fire hazard map with the Ventura County Fire Protection District in order to update City information.

2.5 DISASTER PREPAREDNESS

The City of Thousand Oaks has prepared a draft Emergency Operations Plan (EOP; Multi-Hazard Function Plan) that provides emergency guidelines for responding to natural disasters and technological incidents. The Plan focuses on potential large scale disasters which can generate unique situations requiring unusual responses, often requiring mutual aid from various agencies. It provides operational protocols to be used in various emergency situations, describes the Local Emergency Management Organization, and outlines specific agency responsibilities in the overall protection of life and property. The Plan also outlines mutual aid agreements (County, State, and Federal) and specific statutory authorities.

2.5.1 Goals

Provide for the preparation and implementation of plans for the protection of persons and property within the City in the event of an emergency or a disaster and provide for the coordination of the emergency or disaster functions of the City with all other public agencies and affected private persons, corporations, and organizations (M.C. 4-4.01).

2.5.2 Policies and Programs

1. Pursuant to Title 4, Chapter 4 of the Municipal Code, the City of Thousand Oaks has created the Emergency Disaster Council. The Council shall continue to review and recommend for adoption by the City Council, emergency and disaster and mutual aid plans and agreements, including such ordinances, resolutions, rules, and regulations as are necessary to implement such plans and agreements (M.C. 4-4.04).

2. Establish a high priority for finalizing and updating the City Emergency Operations Plan. Coordinate emergency response and preparedness efforts with the Ventura County Office of Emergency Services, the American Red Cross, and other appropriate agencies.

3. Provide on-going disaster preparedness training to all City employees. All inspectors and plan checkers within the Building Department shall receive training and certification in post-disaster assessment as provided by the California Building Officials (CALBO) Organization.

4. Support the American Red Cross and other applicable agencies to ensure that adequate shelter facilities are available in the event of an emergency.

5. Periodically inventory emergency relief supplies (sandbags, medical equipment, traffic control equipment, road-clearing equipment, water purification equipment, etc.) to ensure availability during an emergency situation. Coordinate with other agencies to provide supplies/services as appropriate.

6. Evaluate and provide emergency power generation capabilities at key City-owned critical facilities (including the East Valley Law Enforcement Facility, Municipal Service Center, City Hall, and the Wastewater Treatment Plants). Currently, the East Valley Law Enforcement Facility and the Wastewater Treatment Plants have emergency backup power. This equipment should be capable of supplying reserve power for a minimum of 72 hours.

7. The City's Emergency Operations Plan includes plans for short-term and long-term post-disaster recovery, for recovery and reconstruction in areas that are impacted.

8. Promote public awareness of seismic, geologic, flood, fire, and other potential hazards to the public and prospective developers.

9. Become a partner in the Ventura County Mutual Aid Agreement as requested by the Ventura Chapter of the International Conference of Building Officials (ICBO).

10. Coordinate efforts to make necessary supplies available to the community at large.

2.6 HAZARDOUS MATERIALS

More than 60,000 chemicals are produced in the United States. Over 11,000 of these chemicals are used for commercial purposes. Within the County of Ventura, over 5,000 manufacturing and service industries use or store hazardous materials, including pesticides, acids, caustics, solvents, and heavy metals. Because of the widespread use of hazardous materials in our communities, minor and major hazardous materials spills and incidents occur. Most of these incidents are related to the increasing transport of chemicals over roadways (such as U.S. Highway 101 and State Route 23) or through industrial accidents.

In an effort to reduce impacts associated with a hazardous material Incident, Ventura County has developed a Hazardous Materials Emergency Response Plan. This plan is supplemented by individual Business Plans for businesses/facilities that store or handle hazardous materials and wastes. As part of the Business Plan, emergency response plans and procedures must be developed and training sessions must be provided to employees.

About 250 businesses use or store hazardous materials in the City of Thousand Oaks. These businesses include gasoline stations, automotive repair facilities, dry cleaners, and miscellaneous commercial and industrial facilities. A hazardous materials incident could result in injuries, destruction of private and public improvements, contamination of the environment, and even fatalities.

2.6.1 Goals

Protect life, property, and the environment from the effects of releases of a hazardous materials to air, land or water.

2.6.2 Policies and Programs

1. Manage hazardous wastes and materials in such a way that waste reduction through alternative technology is the first priority, followed by recycling and on-site treatment, with disposal as the last resort.

2. Continue to work with the County to implement the County Hazardous Materials Emergency Response Plan (developed by the Ventura County Environmental Health Department).

3. Strive to locate businesses that utilize hazardous materials in areas which will minimize risk to the public or the environment.

4. Coordinate with the Ventura County Environmental Health Department and the Regional Water Quality Control Board to encourage cleanup of sites that have been impacted by hazardous materials releases -- especially those that have impacted ground water.

5. Implement programs to ensure proper disposal of household hazardous wastes. Educate the public about the importance of complying with such programs.

6. Continue to coordinate with the Ventura County Sheriff's Department, the California Highway Patrol, and the Ventura County Fire Department regarding regional plans for transportation corridors for hazardous materials.

Technical Background Report

1.0 GEOLOGY/SEISMICITY

1.1 REGIONAL GEOLOGY

1.1.1 Stratigraphy

Geologic conditions near the Thousand Oaks area include a thin sedimentary/soil cover over bedrock. Miocene age Conejo Volcanics are found in the south and western parts of the City. These rocks are hard and generally stable. Softer marine sediments of the Topanga and Monterey formations of Miocene age are found within the eastern and southern areas of the City, and the Sespe, Llajas, Santa Susana, and Chatsworth formations of Oligocene to Cretaceous age are found near the northeast part of the City. Unconsolidated alluvial sediments are found within canyons and the Conejo Valley bottom. Locally, soil cover and landslides occur on the hill sides. Plate 1 (Geologic Hazards Map) shows the location of volcanic, sedimentary and alluvial sequences within the Planning Area.

The stratigraphic and lithologic features of the major rock sequences of the Thousand Oaks area [compilation of sources including, Weber (1973) and (1984), French (1980), and Diblee (1990) and (1993)] are described by age group as follows:

Upper Cretaceous, Chatsworth Formation (Kcs) - Thick, mostly north dipping sequence of very resistant marine, arkosic sandstone, siltstone, and conglomerate. Outcrop restricted to small area in the eastern part of Conejo Valley.

Paleocene or Early Eocene, Santa Susana Formation (Ts) - North dipping, marine claystone, siltstone and conglomerate. Outcrops in northeastern part of the valley.

Eocene, Llajas Formation (Tll) - North dipping, claystone siltstone and sandstone. Outcrops in northeastern part of the valley.

Oligocene, Sespe Formation (Tsp) - Non-marine sandstone and conglomerate with outcrops restricted to small exposure in the northeastern part of the valley.

Middle Miocene, Conejo Volcanics (Tcv) - Mostly north dipping sequences of volcanics consisting of andesitic to basaltic flows, breccias, and agglomerates, tuffs, and dikes with a total thickness of 13,000 feet. These rocks crop out over much of the valley.

Middle Miocene, Topanga Formation (Tt) - Marine clay shale, siltstone and sandstone that is time equivalent to the Conejo Volcanics and occurs both interbedded with it and in fault contact with it. Crops out over eastern half of the valley with total thickness of 9,000 feet.

City of
Thousand Oaks
Safety Element

Rincon Consultants

PLATE 1
Geohazards Map
EXPLANATION

Alluvium -
unconsolidated to loosely consolidated deposits

The following geologic hazards may exist in the areas covered with unconsolidated to poorly consolidated alluvium:

- seismically induced ground shaking.
- poorly compacted soils may densify.
- liquefaction in areas of shallow groundwater (less than 50' below grade); highest hazard areas are mapped separately.
- clay-bearing soils may be expansive.
- excessive erosion may occur in cut slopes during periods of precipitation.
- flooding hazards near creek beds.
- slope sloughing along creek banks during periods of heavy stream flow.

Sedimentary Rocks -
shale, siltstone, and sandstone sequences

The following geologic hazards may occur in areas comprised of sedimentary rocks:

- seismically induced ground shaking.
- may produce landslides especially in the Topanga and Monterey Formations and along northward facing slopes.
- steep slopes may be unstable, resulting in mudslides and debris flows, especially during periods of rainfall and seismically induced ground shaking.
- rockfalls may occur on steep slopes (generally >40°) and during and following seismically induced ground shaking (rockfall hazard moderate).
- may yield expansive soils, especially in areas consisting of clay shale of the Topanga and Monterey Formations.

Volcanic Rocks -
extrusive and intrusive rocks of the Conejo Volcanics

The following geologic hazards may occur in areas comprised of volcanic rocks:

- seismically induced ground shaking.
- potential to produce debris flows during periods of heavy rainfall.
- rockfalls may occur on steep slopes (generally >40°) and during and following seismically induced ground shaking (rockfall hazard high).
- may produce landslides.
- may produce expansive soils, especially in areas of clay-bearing weathered basalt.

Landslides
(High Hazard)

The following geologic hazards may occur in the areas consisting of landslides:

- movement of the landslide mass during and following seismically induced ground shaking.
- poorly compacted soils may densify.
- excessive erosion may occur in cut slopes during periods of precipitation.
- mud and debris flows occur during and following periods of rainfall.

Liquefaction Hazard Area
(Moderate to High Hazard)

- Areas of moderate to high liquefaction potential as mapped by Leighton and Associates (1974).
- Other mapped alluvial areas may also be susceptible to liquefaction but are considered to have a low to moderate hazard potential.

Known Seepage or groundwater problem area
(Moderate Hazard)

Fault
(Moderate to High Hazard)

Dashed where indefinite or inferred, dotted where existence is doubtful.

- The Sycamore Canyon Fault, Boney Mountain Fault, and L-1 Lineament are potentially active faults and represent a high hazard. None of these faults exhibit any evidence of surface displacement during the past 11,000 years.
- Other mapped faults in the planning area are not known to be active or potentially active and represent a moderate hazard.

Sources

Dibblee, 1990 and 1993
Yerkes, 1991
Weber, 1984 and 1973
Leighton and Associates, 1974

Note

This map is intended for general planning purposes only. The map does not show sufficient detail to make conclusions about individual properties and is not intended to replace site specific engineering and geologic investigations.

The street and topographic data that form the background for this presentation were compiled from multiple sources. In some cases, conflicting data required that the cartographer exercise judgement in the resolution of such conflicts. No field verification has been done to ascertain the accuracy of these judgements.

Middle and Late Miocene, Monterey Formation (Tm) - Described previously as the Modelo Formation (Weber, 1984), this unit is described as marine biogenic thinly bedded to finely laminated siliceous shales. This unit crops out over much of the eastern third of the valley.

Quaternary Alluvium (Qal) - Alluvium covers much of the floor of the Conejo Valley and the bottoms of stream channels. The alluvium is comprised of unconsolidated deposits of boulders, cobbles, pebbles, sand, silt, and clay deposited by streams. It is typically 100 feet or less in thickness.

1.1.2 Structural Geology

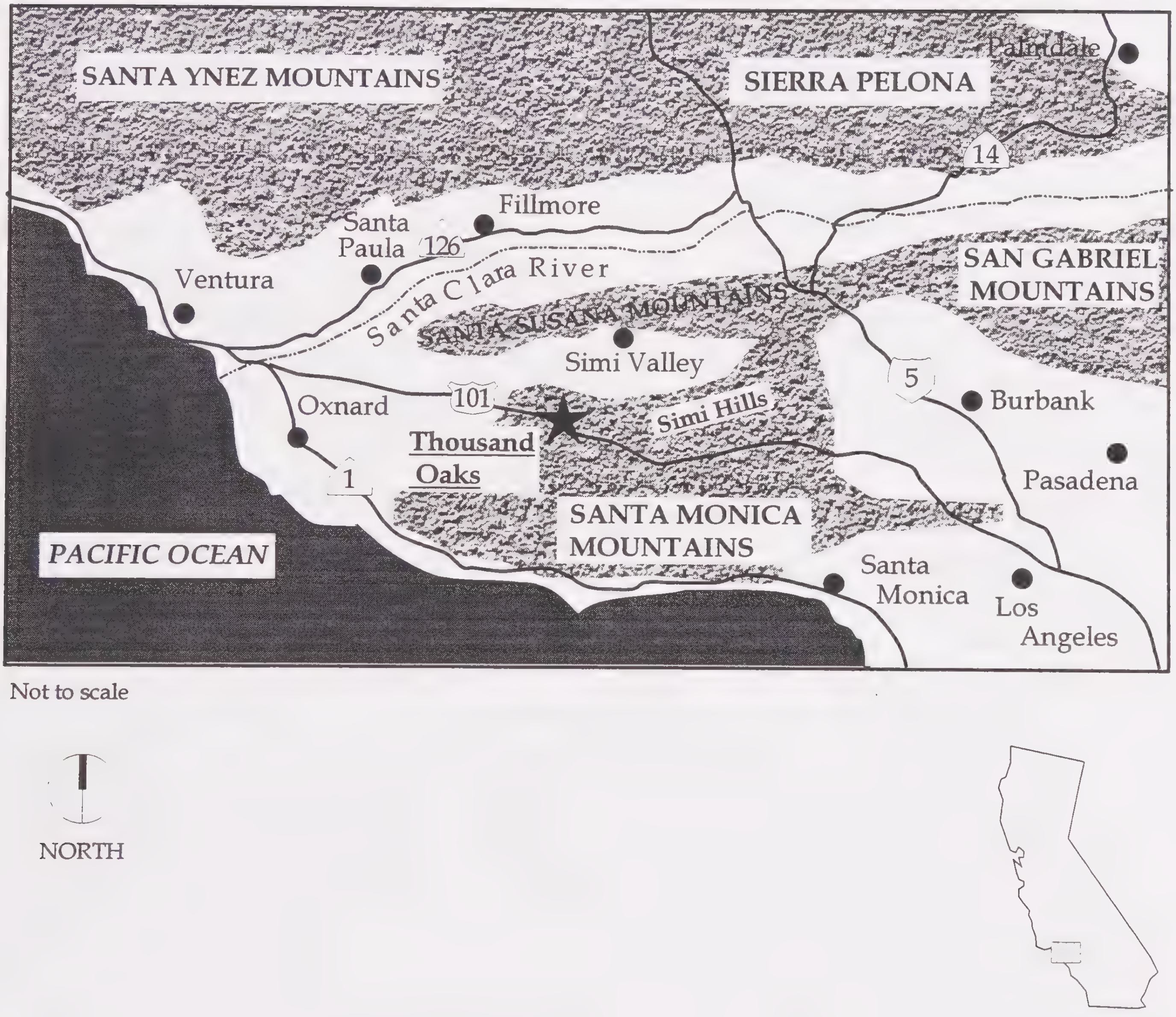
The City of Thousand Oaks lies within the very southern part of the west-central portion of the Transverse Ranges geologic province of southern California. This province is characterized by east-west trending folds, faults, and mountain ranges -- which is transverse to the northwest trend of most of the geologic features in California (see Figure 1-1). Structural geology of the region has been described in several reports including Weber (1973 and 1984), AEG (1981), and Yeats (1988 and 1994).

Hilly and mountainous areas within the Transverse Ranges are referred to as structural highs, whereas valley areas generally reflect structural lows (Weber, 1984). The Conejo Valley forms a structural low known as the Conejo-Las Virgenes low (roughly coincident with U.S. Highway 101). South of the Conejo Valley, the north edge of the Santa Monica Mountains forms a structural high. This structural high area comprises the southern margin of the Transverse Ranges province. North of the Conejo Valley is the Simi Hills structural high and further to the north lies the Simi-Tierra Rejada-Santa Rosa valleys structural low.

The Santa Monica and Conejo Mountain areas had their beginning in the Cretaceous period (over 75 million years ago). During this time, marine and non-marine sediments began accumulating in the subsiding Ventura Basin. Following the emplacement of the sediments, the area was affected by volcanic activity, faulting, and folding. The latest period of major tectonics occurred during the middle of the Pleistocene (about 1 million years ago), when most of the present land forms were formed.

Regional east to west trending folds have been accompanied by simultaneous reverse faulting (Weber, 1984). The Malibu Coast Fault (to the south) and the Simi-Santa Rosa fault zone (to the north along the northern edge of the Tierra Rejada and Simi valleys) are the major reverse faults in the vicinity of the site. These faults are considered the most likely sites for nearby possibly damaging earthquakes that could affect the Thousand Oaks area. Figure 1-2 shows the location of these and other regional faults.

No active faults have been mapped within the City of Thousand Oaks. Two Quaternary age faults (faults with movement in the last 1.6 million years), the Boney Mountain and Sycamore Canyon



Regional Location Map

Figure 1-1

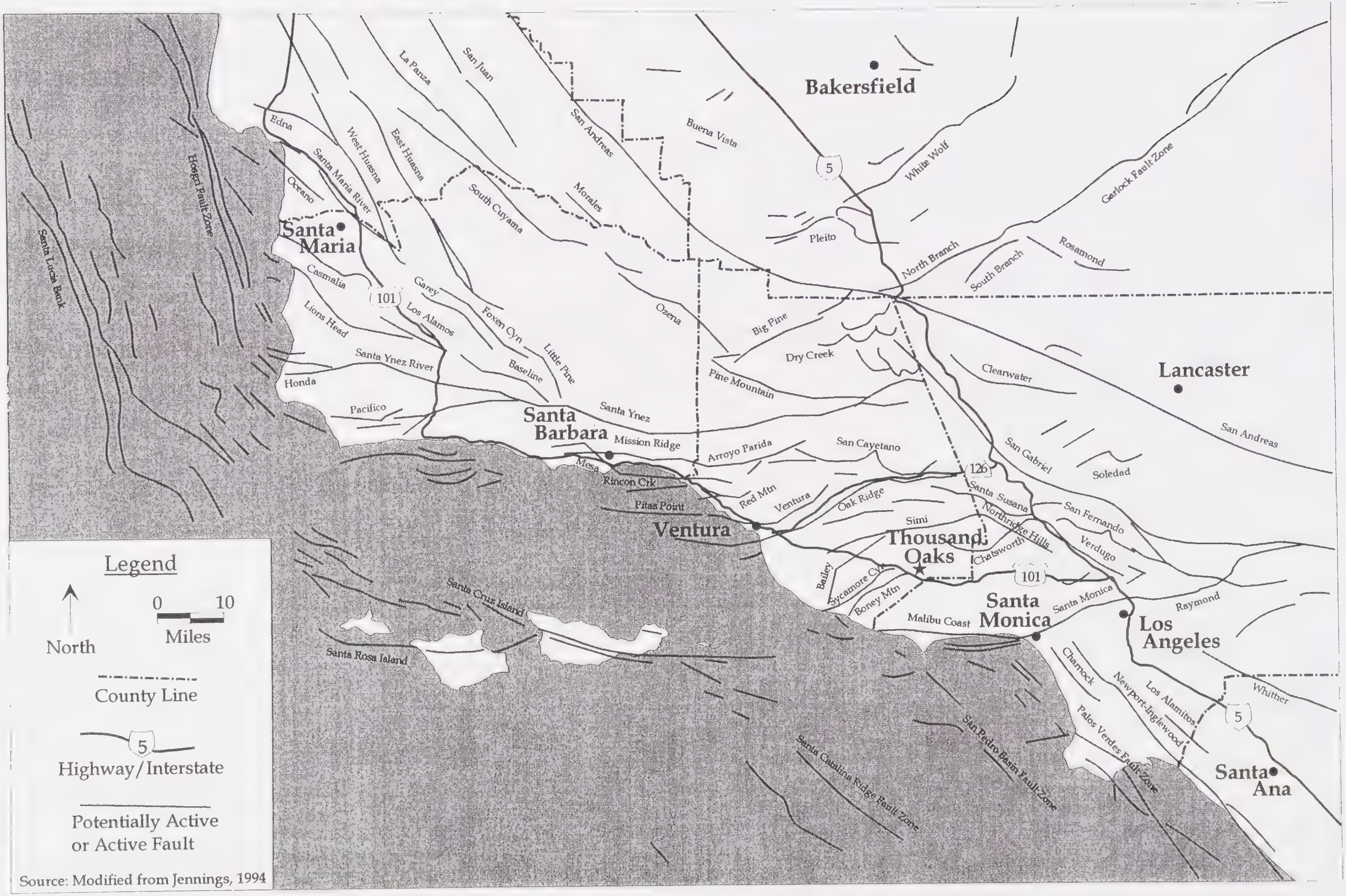


Figure 1-2

Regional Fault Map

faults, cross within the city limits (Diblee and Ehrenspeck, 1990).

1.2 SEISMIC SETTING

The regular occurrence of earthquakes in the southern California area serves as ongoing evidence that the area is seismically active. Although nothing can be done to prevent the occurrence of earthquakes, through proper construction design and planning, their destructive effects can be reduced. Within the last several decades, there has been a recognition that structures should not be built over active fault traces. Ongoing earthquake research has resulted in improved construction standards for buildings, roadways, and other structures. Another approach to increasing awareness of seismic hazards has been the State requirement that local governments address seismic safety issues in their General Plans [Government Code Section 65302(g)]. This Safety Element meets the requirement to consider the goals, programs, and policies that are to be followed to reduce the danger of earthquakes.

Earthquake hazards are manifested in many ways, including ground rupture, ground shaking, landslides, tsunamis, liquefaction, and seiches. Secondary hazards that can be caused by earthquakes include flooding due to dam failure, urban fires, and toxic chemical releases. The Seismic Hazards section of this document focuses on the hazards of ground shaking, liquefaction, and ground rupture that could occur within the City of Thousand Oaks.

1.2.1 Regional Seismicity and Earthquake History

Earthquakes occur along active faults. One of the tools used in the evaluation of seismic risk is the historical earthquake record. These records list when an earthquake occurred, its epicenter and depth below ground surface, and strength (Modified Mercalli Intensity or Magnitude). Seismic records in southern California date back about 200 years -- to the time of Spanish colonization. Earthquake recurrence along an individual fault can be on the order of thousands of years, so the historical record alone is not sufficient to fully determine the seismic risk that an area may experience. Despite these limitations, a review of historical seismicity has value in evaluating the seismicity that an area may undergo. The accuracy of the database increases with time; events before about 1940 are based on colloquial data and are not instrumentally recorded. These events, therefore, may not accurately locate the recorded event.

Historical Seismicity of the Thousand Oaks Area. Records of historical earthquakes that have affected southern California are maintained by the United States Department of Commerce, National Oceanic and Atmospheric Administration (NOAA). A NOAA data base search was performed for the City of Thousand Oaks (34° 10.5' North, 118° 50' West). Earthquakes greater than magnitude 4 and within 50 miles of the site were plotted. Earthquakes with magnitudes of less than 4 were eliminated from the record because earthquake damage occurs from larger magnitude events (typically events greater than magnitude 5). Elimination of the smaller magnitude events thus serves to screen out seismic noise and minor events that pose an insignificant seismic risk. A 50-mile radius was selected to focus on faulting that has the

greatest potential to cause damaging ground shaking. Because the strength of ground shaking diminishes with distance, events beyond 50 miles pose a minor ground shaking risk to the Thousand Oaks area.

A total of 612 earthquakes, including duplicated events, are listed on the NOAA earthquake file. The earthquake epicenters are depicted in Figure 1-3 . The data base includes the Northridge (1994, magnitude 6.7), Whittier (1987, magnitude 5.9), Point Mugu (1973, magnitude 5.9), San Fernando (1971, magnitude 6.5), Arvin-Tehachapi (1952, magnitude 7.7), Santa Barbara Channel (1812, magnitude 7.2, 1941, magnitude 5.9, and 1968, magnitude 5.7) and Long Beach (1933, magnitude 6.3) earthquakes. The nearest recorded earthquake to the City of Thousand Oaks occurred in 1911. This event occurred 5 miles from the search location, had a magnitude of 4 and a MMI of IV. Ten events (two of which are suspected duplicates) have been recorded within 10 mile of this site. Of these 10 events, the one with the greatest magnitude (4.7) was recorded in 1976 and was located about 9 miles from the site search point. Two hundred and three events (including duplicates) have been recorded within 20 miles of the site. This distance includes the Northridge earthquake (1994, magnitude 6.7, MMI IX, located about 17 miles from the search point) and related aftershocks, and aftershocks associates with the San Fernando (1971, magnitude 6.5) earthquake.

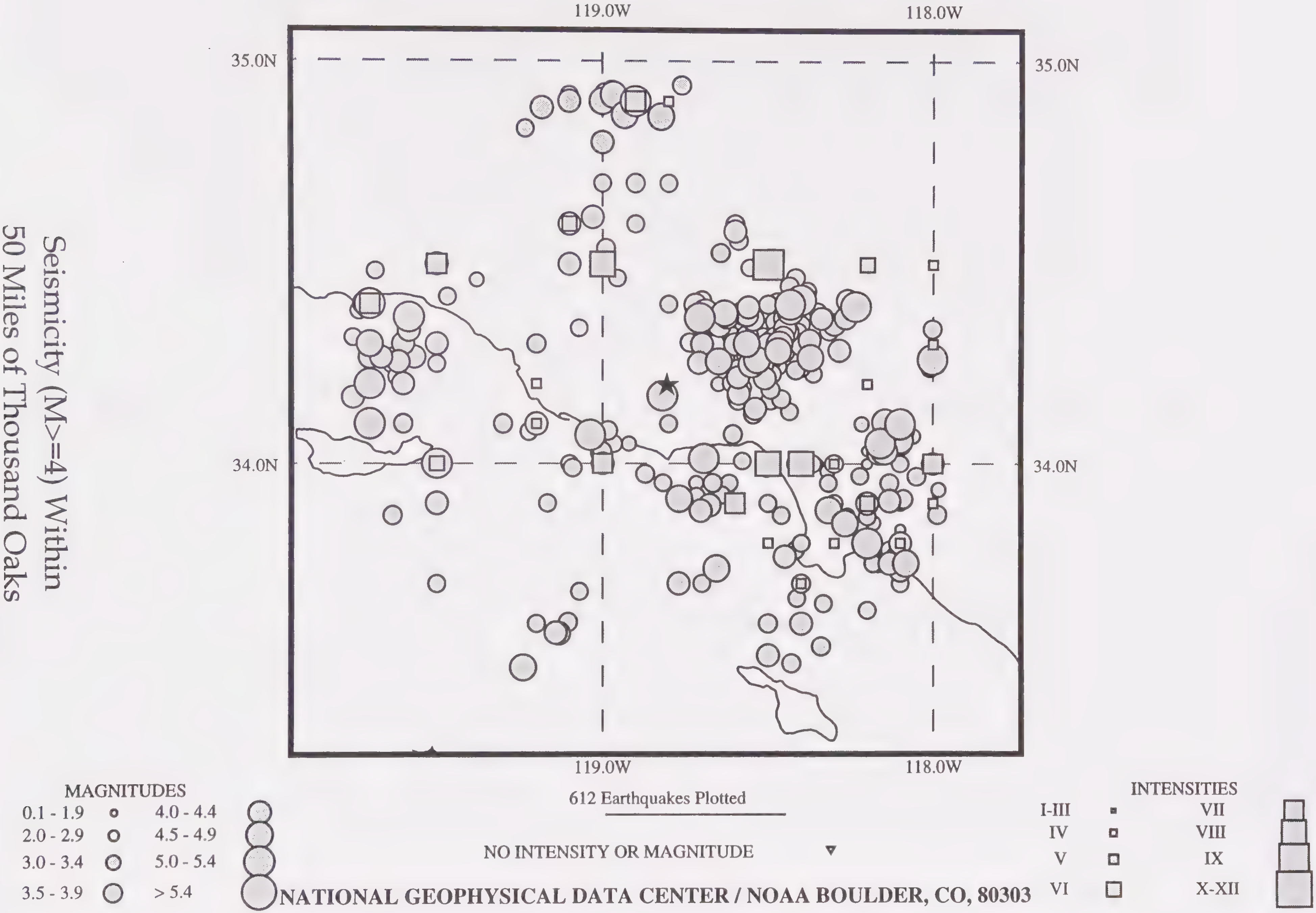
The greatest magnitude event listed in the NOAA search is a magnitude 7.2 event which occurred in 1812. This earthquake was located in the Santa Barbara Channel, and was located about 50 miles from the site. Ten earthquakes having a magnitude of 6 or greater are listed in the NOAA data base. The nearest magnitude 6 or greater event was the Northridge (1994, magnitude 6.7) earthquake, located about 17 miles from the site.

Summary. The Thousand Oaks area is in a seismically active region. The NOAA data base of historical seismicity listed 612 events within 50 miles of the project area. The nearest recorded earthquake occurred 5 miles from the project search area. This event had a magnitude of 4. The greatest recorded earthquake within 50 miles of the site was a magnitude 7.2 event within the Santa Barbara Channel which occurred in 1812. Ten earthquakes having a magnitude of 6 or greater were listed in the NOAA data search. The nearest magnitude 6 or greater was the Northridge (1994) earthquake, having a magnitude of 6.7 and located 17 miles from the site.

1.3 GEOLOGIC HAZARDS

Geologic hazards that pose the greatest concern to the City of Thousand Oaks include seismically induced ground shaking, fault rupture, landslides, debris flows, mudslides, rockfalls, expansive soils, and flooding (Weber, 1984). All of these hazards have affected the Thousand Oaks area to some extent since the mid-1950s, when rapid development began. An awareness of these potential geohazards is needed with increased population density and encroachment into the hills and mountains.

SEISMICITY (M>=4) WITHIN 50 MILES OF THOUSAND OAKS, CA.



Seismicity (M>=4) Within 50 Miles of Thousand Oaks

Figure 1-3

1.3.1 Ground Shaking

Introduction. Earthquake-generated ground shaking is the greatest cause of widespread damage in an earthquake. The California Seismic Safety Commission (1993, 1994) estimates that ground shaking causes 99% of the earthquake damage to residences and other structures in California. Local conditions can greatly influence the intensity of ground shaking. Types of soil, depth to bedrock, depth to groundwater, and orientation of the fault movement all influence the intensity of ground shaking.

Ground shaking is the shock wave produced when there is a sudden movement created by an earthquake rupture. As the shock wave travels away from the hypocenter (the point of rupture), energy is lost and the intensity of the wave diminishes. In general, ground shaking diminishes as the distance from the earthquake epicenter increases. This attenuation relationship has been studied by numerous scientists, resulting in several attenuation models. Distance from the hypocenter also affects the form of the ground shaking. For sites near (within about 10 miles) the hypocenter, one may feel a sharp, high frequency shock wave. This type of shock wave tends to affect short (one to two story) structures. At greater distances, the high frequency shock wave is attenuated and one feels a rolling motion. This rolling motion tends to affect higher structures (multi-story structures, towers, large tanks).

A common scale used to measure the magnitude of an earthquake is the Richter scale. Richter magnitude is a logarithmic measurement of the maximum motion of the earthquake event as recorded on a seismograph. Richter magnitude is defined as the logarithm of the maximum amplitude on a seismogram written by an instrument of a specified standard type calculated to be at a distance of 62 miles (100 km) from the epicenter. By definition, Richter magnitude is fixed to an event and does not vary with distance. Seismically induced ground shaking can also be measured quantitatively as ground surface acceleration (acceleration with respect to the force of gravity-[g]), and qualitatively by the modified Mercalli scale (see Table 1-1). Because of the attenuation of ground shaking with distance, modified Mercalli intensities (MMIs) vary depending on distance from the earthquake, soil type, resonance of the underlying sediments, and other site specific phenomena.

One way that geologists classify faults is on their movement history. As defined by the California State Mining and Geology Board (Hart, 1994), faults that have had surface displacement within the last 11,000 years (Holocene age) are considered ***active*** faults. Faults are considered ***potentially active*** if they show evidence of surface displacement during Quaternary time (within the last 1.6 million years).

California's Alquist-Priolo Special Studies Zones Act of 1972 regulates the development and construction of structures in the state. This act is designed to reduce earthquake hazards to life and property. Active and potentially active faults are to be considered during construction within the state.

When designing a structure, it is important to consider the likely earthquake that a fault can produce. A ***maximum probable earthquake*** is the largest earthquake that is expected to be produced within a 100-200 year time frame. Because the life of most structures is on the order of this range, maximum probable earthquakes are commonly used as design criteria for a structure. A ***maximum credible earthquake*** is the largest event that can be produced by a particular fault, regardless of time span. For critical structures, such as dams, emergency operation centers, fire stations, nuclear power plants, and other similar buildings, the maximum credible earthquake is often used as the seismic design criteria.

TABLE 1-1 MODIFIED MERCALLI INTENSITY SCALE (ABRIDGED)[1]

INTENSITY	DESCRIPTION
I	Not felt except by a very few under especially favorable circumstances.
II	Felt by only a few persons at rest, especially on upper floors of buildings. Delicately suspended objects may swing.
III	Felt quite noticeably indoors, especially on upper floors of buildings, but many people do not recognize it as an earthquake. Standing motorcars may rock slightly. Vibration like passing of truck. Duration estimated.
IV	During the day, felt indoors by many, outdoors by few. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motorcars rocked noticeably.
V	Felt by nearly everyone, many awakened. Some dishes, windows, and so on broken; a few instances of cracked plaster; unstable objects overturned. Disturbance of trees, poles, and other tall objects sometimes noticed. Pendulum clocks may stop.
VI	Felt by all; many are frightened and run outdoors. Some heavy furniture moved; a few instances of fallen plaster and damaged chimneys. Damage slight.
VII	Everybody runs outdoors. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable in poorly built or badly designed structures; some chimneys broken. Noticed by persons driving motorcars.
VIII	Damage slight in specially designed structures; considerable in ordinary substantial buildings, with partial collapse; great in poorly built structures. Panel walls thrown out of frame structures. Chimneys, factory stacks, columns, monuments, walls fall. Heavy furniture overturned. Disturbs persons driving motorcars.
IX	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb; damage great in substantial buildings, with partial collapse. Buildings shifted off foundations. Ground cracked conspicuously. Underground pipes broken.
X	Some well-built wooden structures destroyed; most masonry and frame structures destroyed along with foundations; ground badly cracked. Rails bent. Landslides considerable from river banks and steep slopes. Shifted sand and mud. Water splashed (slopped) over banks.
XI	Few, if any, (masonry) structures remain standing. Bridges destroyed. Broad fissures in ground. Underground pipelines completely out of service. Earth slumps and land slips in soft ground. Rails bent greatly.
XII	Damage total. Waves seen on ground surface. Lines of sight and level distorted. Objects thrown into the air.

[1] USGS (1985).

Hazard Analysis. No active faults have been mapped within the City of Thousand Oaks planning area boundary. However, because of the proximity of active faults, ground shaking has affected and will continue to affect the Thousand Oaks area.

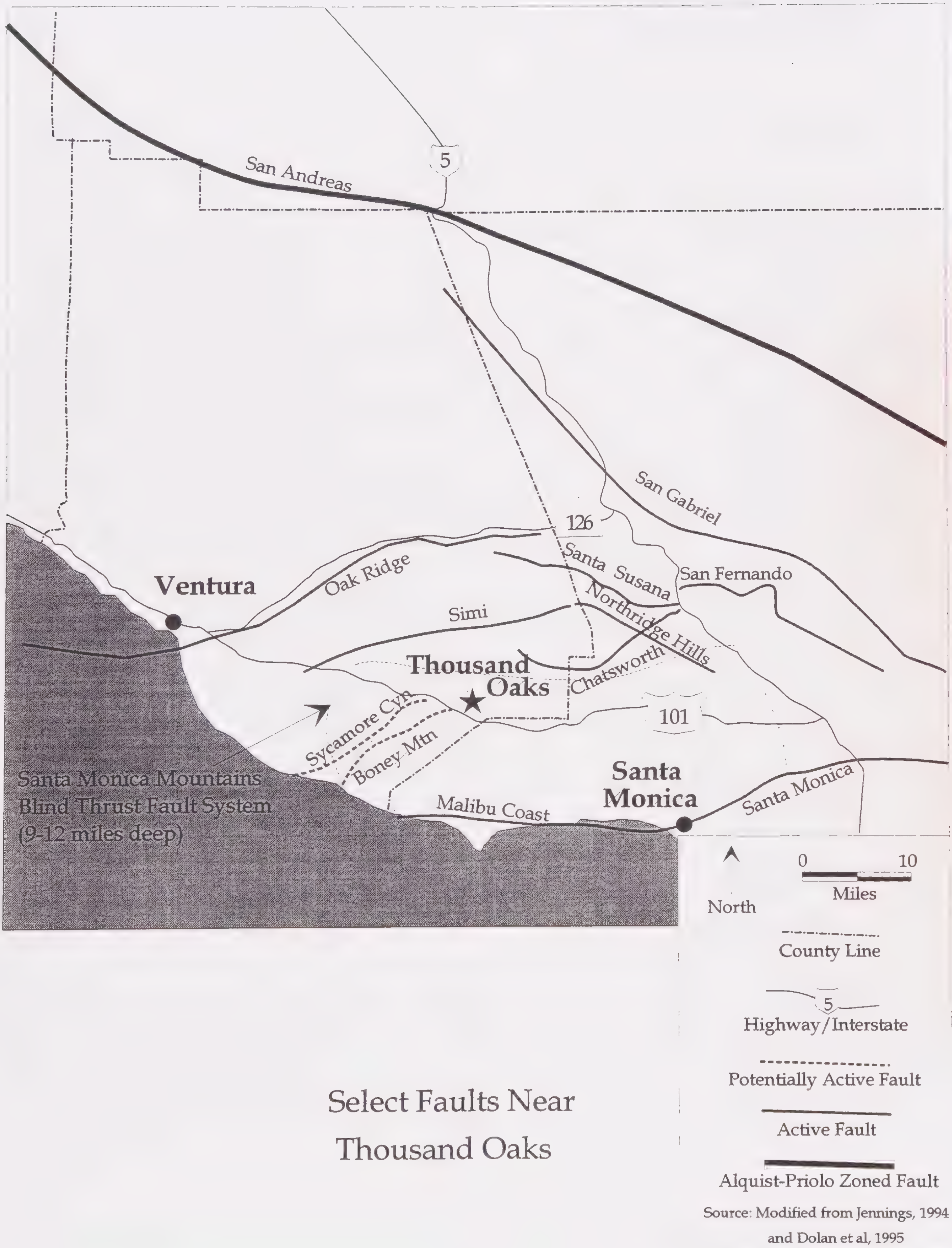
Ground shaking caused by the magnitude 6.7 Northridge Earthquake of January 17, 1994 resulted in the single most costly natural disaster in U.S. history (Earthquake Engineering Research Center, 1994). Over 33 fatalities and 7,000 injuries were attributed to the earthquake (Science, 1994). Damages were widespread and included six sections of collapsed highway structures, thousands of damaged or destroyed residential and commercial structures, widespread disruption of utilities and other lifeline facilities, and numerous landslides and soil embankment failures (Earthquake Engineering Research Center, 1994). In all, over 14,000 structures in 28 cities were damaged by the earthquake. In the City of Thousand Oaks, located about 20 miles from the epicenter, over 850 building permits have been issued by the City to repair earthquake damage.

As stated previously, ground shaking attenuates with distance, thus, active faults near the City of Thousand Oaks have the potential to produce the greatest ground accelerations. The 1994 Northridge earthquake resulted in accelerations (rock sites) of up to about 0.5 g near the epicenter and accelerations of about 0.25 to 0.3 g near the City of Thousand Oaks (EERC, 1994).

Table 1-2 provides a listing of the closest and most significant regional faults that are modeled herein to predict ground shaking that would be produced within the planning area. Figure 1-4 shows the locations of these faults with respect to the City. For each fault, the table lists maximum credible earthquake (MCE) magnitudes, modified Mercalli intensities and peak ground accelerations. Attenuation relationships developed by Idriss (1985) -- which are applicable for rock sites -- were used to calculate peak ground accelerations. MMIs were calculated for each fault using the relationship between ground shaking intensity and MMI (Evernden and Thomson, 1985). MMIs can be influenced by site specific features, such as the thickness of loosely consolidated alluvium and the depth to groundwater. These factors have not been included in the calculation of expected MMIs, thus, the actual intensities that are felt at a site could differ from the levels calculated here.

As shown in Table 1-2, the Simi fault is anticipated to be capable of generating the highest ground accelerations and MMIs for active faults in the area. Peak ground accelerations associated with this fault are depicted in Figure 1-5.

For potentially active faults, the Boney Mountain and Sycamore Canyon faults, because of their occurrence within the planning area, would have the highest ground accelerations and MMIs. The acceleration and intensity data presented herein is provided for general planning purposes, not for specific design considerations. Site specific design studies are necessary to adequately model ground accelerations and MMIs for a particular structure and area.



Select Faults Near Thousand Oaks

Figure 1-4

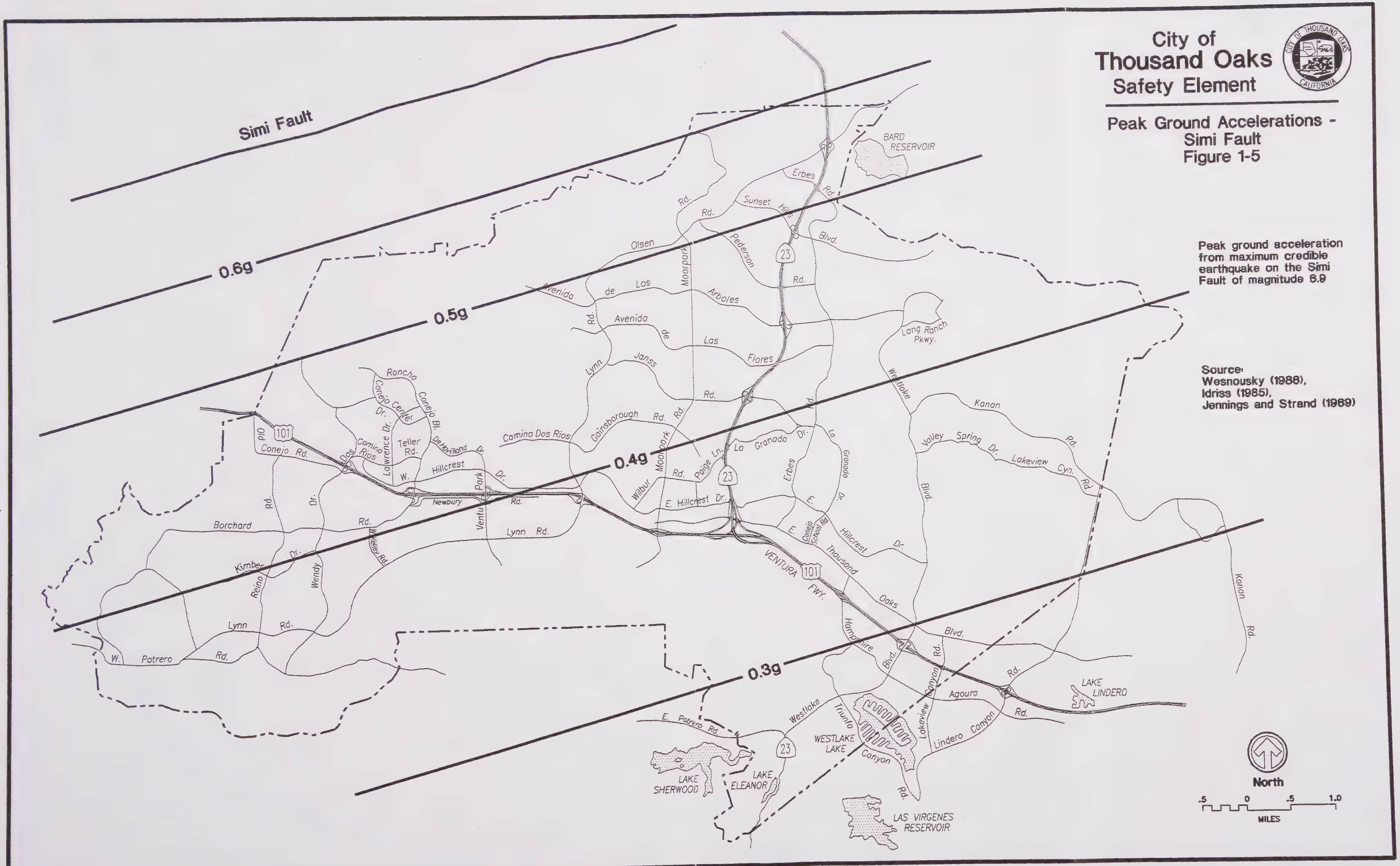

City of
Thousand Oaks
Safety Element
Peak Ground Accelerations -
Simi Fault
Figure 1-5
Peak ground acceleration from maximum credible earthquake on the Simi Fault of magnitude 6.9
Source:
Wesnousky (1986),
Idriss (1985),
Jennings and Strand (1969)
Simi Fault
0.6g
0.5g
0.4g
0.3g
BARD RESERVOIR
LAKE LINDERO
WESTLAKE LAKE
LAKE SHERWOOD
LAKE ELEANOR
LAS VIRGENES RESERVOIR
VENTURA FWY.
North
MILES

Table 1-2 Estimated Ground Accelerations and Intensities

	Design	Distance	Acceleration[4]	
Active Faults				
Simi	6.9[1]	1-8	0.28-0.6	IX-X
Chatsworth	6.3[1]	6-16	0.12-0.3	VIII-IX
Malibu Coast	7.3[2]	8-16	0.2-0.3	VIII-IX
Oak Ridge	7.3[2]	8-17	0.2-0.3	VIII-IX
Santa Monica Mountains Thrust	7.2[1]	9[2]	0.26	IX
Santa Susana	6.9[2]	9-20	0.13-0.23	VIII-IX
Northridge Hills	6.6[1]	9-20	0.11-0.21	VIII- IX
San Fernando	6.8[2]	18-29	0.08-0.15	VII-VIII
San Gabriel	7[1]	19-30	0.1-0.15	VII-VIII
San Andreas	8.25	39-50	0.11-0.15	VIII
Potentially Active Faults				
Boney Mountain	6[3]	0.6-7	0.2-0.5	VIII-X
Sycamore Canyon	6.2[3]	0.6-7	0.21-0.51	IX-X

1-Wesnousky (1986) 3-Slemmons (1977) 5-Evernden and Thomson (1985)
2-Dolan et al, (1994) 4-Idriss (1985) MMI = Modified Mercalli Intensity

Sycamore Canyon Fault. As shown on the Fault Activity Map of California (Jennings, 1994), the Sycamore Canyon fault has Quaternary but not Holocene offsets (i.e., offsets occurred between 11,000 and 1.6 million years ago). This fault, therefore, is considered **potentially active**. The Sycamore Canyon fault has a mapped length of about 13 miles (Jennings and Strand, 1969) and extends from the Pacific Ocean northeast to Thousand Oaks. The Sycamore Canyon fault crosses within the city boundary. If this fault were to be active, it would be expected to create a maximum credible earthquake of 6.2 (Slemmons, 1977) and could potentially produce ground accelerations of 0.21-0.51. Because this fault is so close, ground shaking would be a sharp, high frequency wave.

Ground shaking intensities from a Sycamore Canyon fault earthquake range from MMI IX-X. The peak ground level acceleration attenuates as distance from the fault increases, resulting in a decline in intensity away from the fault.

Boney Mountain Fault. The Boney Mountain fault is also shown on the Fault Activity Map of California (Jennings, 1994) as having Quaternary but not Holocene activity (i.e., offsets between 11,000 and 1.6 million years ago).. Thus, this fault is considered **potentially active**. The Boney Mountain fault has a mapped length of about 9 miles (Jennings and Strand, 1969) and extends from the coastline northeast towards Thousand Oaks. This fault is modeled to produce a maximum credible earthquake of 6 (Slemmons, 1977). Ground accelerations could range from 0.2-0.5 and MMI could range from VIII-X. Because this fault is so close, ground shaking would be a sharp, high frequency wave.

L-1 Lineament. The L-1 bedrock fault, located in the southwestern portion of the City, is a near vertical fault located within the Conejo Volcanics. The L-1 fault was originally mapped as a prominent lineament defined by vegetation alignments. As part of the proposed Dos Vientos development project in the southwestern portion of the City, the lineament was trenched

at numerous locations and was judged to be a bedrock fault that does not penetrate the overlying pre-Holocene (12,000 to 15,000 year old) surficial deposits (Keith W. Ehlert Consulting Engineering Geologist, 1994). The fault is, thus, not believed to be active. Because no sediments or soil profiles older than 15,000 years old overlie the Miocene Conejo Volcanics, which are about 15 million years old, it is possible that the L-1 fault could be Quaternary in age and, thus, **potentially active**. Quaternary activity on this fault is thought to be unlikely, though (Keith W. Ehlert Consulting Engineering Geologist, 1994), for the following reasons: 1) this fault is thought to be a vertical fault in contrast to contemporary seismicity and associated active faults in the Transverse Ranges which are almost exclusively associated with north-dipping reverse faults, and 2) the fault does not appear to be a major feature that extends for any great distance. Because of the questionable nature of recency of activity on this fault, an acceleration or intensity has not been assigned herein.

Simi Fault. The Simi fault is the nearest active fault to Thousand Oaks crossing within about 1 mile of the City (Jennings, 1994). This fault extends from the Las Posas Hills area near Camarillo (where it is mapped by Jennings and Strand [1969] as the Santa Rosa fault) eastward through the southern flank of Big Mountain (the northern edge of Simi Valley). This fault aligns with the Northridge Hills fault which continues eastward into the San Fernando Valley. The Simi fault (including the Santa Rosa fault) has a mapped length of about 28 miles (Jennings and Strand, 1969) and is described by Irvine (1991) as a northern dipping reverse fault. Although offset along this fault is late Quaternary in age, there also appears to some evidence of Holocene fault activity (Ziony and Yerkes, 1985 and Blake, 1991) and, thus, for purposes of this study is considered **active**.

The Simi fault is modeled as being able to generate a maximum credible earthquake of magnitude 6.9 (Wesnousky, 1986). Such an event could generate ground accelerations of 0.28-0.6g through Thousand Oaks (highest calculated acceleration for the City), resulting in MMI's of IX - X . The nature of the ground shaking would be a sharp, high frequency wave if the earthquake occurs near Thousand Oaks, or a longer period, rolling wave if the rupture takes place away from the City.

Malibu Coast Fault. The Malibu Coast fault is mapped by Jennings and Strand (1969) as an east-west trending reverse fault. The fault is located within about eight miles south of Thousand Oaks with a fault length of 18 miles. The Malibu Coast fault extends from west of Point Dume near the Ventura-Los Angeles County line, eastward to the City of Santa Monica. There, it is aligned with the Santa Monica-Raymond Hill fault. Jennings (1994) describes this fault as having Late Quaternary to Holocene displacement and is thus, classified as an **active** fault. The Malibu Coast fault has a maximum credible earthquake of 6.9 (Dolan et al, 1995) and an estimated slip rate of 1.0-1.5 millimeters per year (Dolan, et al, 1995) to up to 5 mm per year (Petersen and Wesnousky, 1994) and an earthquake recurrence interval of 1,355-2,035 years (Dolan et al, 1995). If the Malibu Coast fault were to rupture as part of a larger fault system (the Hollywood-Santa Monica-Malibu Coast Fault system), a magnitude 7.3 earthquake could be generated approximately every 2,195 to 3,290 years (Dolan et al, 1995). This fault system would

have a slip rate of 1.0-1.5 mm per year.

Based on a maximum credible earthquake of magnitude 7.3 (Dolan et al, 1995), the Malibu Coast fault would result in ground accelerations of 0.2-0.3 and MMI ground movement of VIII-IX within the City. The nature of the ground shaking would be a sharp, high frequency wave if the earthquake occurs near Thousand Oaks, or a longer period, rolling wave if the rupture takes place away from the City.

Oakridge Fault. The Oak Ridge fault is an east-west trending **active** fault that traverses much of the Santa Clara River Valley, extending from the Santa Paula area to the San Fernando Valley. This fault is a steeply dipping reverse fault that has an onshore length of about 25 miles (SCEC, 1995). As described by Yeats and Huftile (1995), the 1994 Northridge earthquake may have occurred on a continuation of the Oak Ridge fault system. Because slip rates along the Oak Ridge fault (5 millimeters per year) are nearly three times greater than the Northridge blind thrust fault (the actual fault responsible for the Northridge earthquake), they speculate that there is a potential for a Northridge-size earthquake in the Ventura Basin area. The recurrence interval of this fault is estimated at 250 to 500 years (Yeats, 1989). The Oak Ridge fault is located within about eight miles north of the City of Thousand Oaks.

The Oak Ridge fault is modeled as having the potential to produce a magnitude 7.3 earthquake (Dolan et al, 1995). Such an event could produce ground shaking acceleration of 0.2-0.3 g and a MMI of VIII-IX in the Thousand Oaks area. The nature of the ground shaking would be a sharp, high frequency wave if the earthquake occurs near Thousand Oaks, or a longer period, rolling wave if the rupture takes place away from the City.

San Andreas Fault. The San Andreas fault is mapped by Jennings (1994) as a northwest-southeast trending **active** fault with a length of over 600 miles. This fault forms the plate tectonic boundary between the Pacific plate to the west and the North American plate to the east. The San Andreas Fault has an estimated slip rate of 16-38 mm per year and a recurrence interval of 132 years for large earthquakes (Petersen and Wesnousky, 1994). Numerous earthquakes have been recorded along the San Andreas fault. Of the faults discussed here, the San Andreas fault has the highest possibility of future rupture. Because this fault is located about 40 miles from Thousand Oaks at its closest approach, ground shaking from a San Andreas fault event would be somewhat attenuated by the time it reached the City.

The San Andreas fault is rated as being able to produce a maximum credible earthquake of magnitude 8.25. Such an earthquake could produce peak ground accelerations of 0.11-0.15 g, or a MMI of VIII. Because of the distance between the City and the fault, the nature of ground shaking would be a long period rolling movement.

Blind Thrust Faults. Low angle thrust faults, known as ***blind thrust faults***, have recently been recognized as a seismic risk in southern California. Blind thrust faults are low angle features that do not reach the ground surface but do have surface expressions in the form of

overlying folds that grow during large earthquakes. The seismic hazard from blind thrust faults has been demonstrated by the Northridge (1994) and the Whittier Narrows (1987) earthquakes. The magnitude 6.7 Northridge earthquake was produced by a south dipping blind thrust fault extending northward from beneath the San Fernando Valley to the Santa Susana Mountains (Jackson et al, 1995). The magnitude of an earthquake that a blind thrust can produce is dependent on the fault's area and characteristic displacement. Earthquakes ranging in size from m = 6.4 to m = 7.5 can be expected on individual blind thrust segments.

The Santa Monica Mountains blind thrust (Petersen and Wesnousky, 1994) underlies the Santa Monica Mountains, extending inland from the Malibu coastline area. This thrust system may extend below the City of Thousand Oaks as identified in recent publications by Dolan et al (1995) and others (see Figure 1-4 for approximate areal extent). Rupture of the Santa Monica Mountains blind thrust fault is believed to be **active** and is estimated to be capable of producing a magnitude 7.2 earthquake every 740 years (Dolan et al, 1995). Slip rate on this blind thrust fault is estimated to be about 4 mm per year. Based on a near distance (beneath the City) of 9 miles, peak ground accelerations could be on the order of 0.26 and a MMI of IX.

Conclusion. The City of Thousand Oaks lies in a seismically active area. Although no active faults have been mapped within the city limits, two potentially active faults (Boney Mountain and Sycamore Canyon faults) do traverse parts of the City. Seismically induced ground shaking has affected the City in the past and is expected to affect the City in the future. Five earthquake events were modeled to determine peak ground accelerations and MMIs that could affect the City. Based on the models, the greatest ground acceleration that the City would be subject to is a peak ground acceleration of 0.6 g, which correlates to a MMI of X. Such an event could be produced from a maximum credible earthquake of 6.9 occurring along the Simi fault. In areas of loosely consolidated alluvium or areas with a water table within 30 feet from ground surface, MMI levels may be greater than the values calculated in the model.

The most recent modeling efforts of seismic experts (probabilistic modeling) have attempted to evaluate earthquake potential for a given area by factoring all available potential fault sources. Jackson et al (1995) have estimated that in the next 30 years, there is about a 40% chance of peak ground accelerations exceeding 0.2 g for the Thousand Oaks area. This corresponds to a MMI of VIII or greater.

Proper design of new structures and strengthening of existing structures can reduce or prevent damage associated with ground shaking. Conformance with the Uniform Building Code in the building of new structures helps reduce the likelihood of damage. In residences, most of the damage caused by groundshaking is the result of:

- *unbraced water heaters,*
- *houses not adequately anchored to their foundations, and*
- *houses that have weak cripple walls, or are on pier-and-post foundation.*

Much of the life-threatening earthquake damage to commercial property is caused by:

- *walls that are poorly anchored to the roof or floors,*
- *unreinforced masonry walls,*
- *poorly reinforced concrete walls or columns.*

The majority of buildings in the Thousand Oaks area were constructed from the 1950's on, and do not have unreinforced masonry walls.

The California Seismic Safety Commission (1993, 1994) has published guidebooks that assist property owners with identifying structural weaknesses and provide recommendations for mitigating these problems. These guidebooks can be ordered directly through the Seismic Safety Commission (Sacramento) and are entitled:

- *The Homeowners Guide to Earthquake Safety*
- *The Commercial Property Owner's Guide to Earthquake Safety*

The City of Thousand Oaks conducted a study of earthquake safety for existing steel water reservoirs in 1985 (Perliter & Ingalsbe Consulting Engineers, 1985). The purpose of the study was to determine the safety of reservoirs constructed prior to 1971 and to make recommendations for improving the safety of those reservoirs where appropriate. Based on information provided by the Public Works Department, all of the listed reservoirs have been seismically upgraded with the exception of the Rolling Oaks Reservoir. No decision has been made with regard to upgrading or replacing this reservoir.

The Rolling Oaks Reservoir is to be analyzed to determine whether to retrofit or replace the facility.

1.3.2 Fault Rupture Hazard

Introduction. Ground rupture occurs when displacement along a fault reaches the ground surface. Ground rupture capable of causing several inches or greater displacement could have a catastrophic effect on the integrity of a structure. Thus, setbacks from active fault traces are incorporated into determining areas that are suitable to develop. A difficulty in determining the fault rupture hazard is predicting where future ground rupture will occur. Fault displacement often is within a fault zone and not necessarily along exact traces of previous breaks. Also, movement typically is along more than one fault break.

The Alquist-Priolo Earthquake Fault Zoning Act, signed into law in 1972, addresses development in areas prone to faulting. Under the act, the State Geologist is required to delineate earthquake fault zones along known active faults in California. The act defines active faults as one which has "had surface displacement within Holocene time (about the last 11,000 years)" [Hart, 1994]. Cities and counties affected by the zones must regulate certain development within the zones. For

proposed development within one of the fault zones, a geologic study must be performed to demonstrate that the sites are not threatened by ground rupture from future faulting.

Hazard Analysis. No mapped active faults have been identified within the city limits of Thousand Oaks. Thus, there are no Alquist-Priolo special study areas within the city limits. The lack of mapped active faults within the City does not preclude ground rupture from occurring within the City. However, until there is evidence of active faulting within Thousand Oaks, the risk of seismically induced ground rupture appears to be minor. Although Alquist-Priolo zonation pertains to active faults, a conservative planning approach would be to limit the development along traces of potentially active faults within the City (Sycamore Canyon and Boney Mountain faults).

Conclusions. No Alquist-Priolo Special Study Zones have been designated within the City of Thousand Oaks. As geologic studies are performed, there is the possibility that active faults may be identified. Thousand Oaks should follow the guidelines of the Alquist-Priolo act for proposed new development within the City. A setback from the mapped potentially active faults should be considered for all development, and especially for critical facilities. Setback distances should be determined through engineering geologic investigation.

1.3.3 Liquefaction

Introduction. Liquefaction is a phenomenon that occurs when loosely consolidated soils lose their load bearing capabilities during shaking and flow in a fluid-like manner. Liquefaction typically occurs in water saturated loosely compacted fine to medium grained sand where the groundwater table is within about 50 feet below grade. When these materials are shaken, such as during an earthquake, pore pressure of the sediments increases, causing the sediment to behave as a liquid. Where the liquefied layer occurs near the ground surface, structures built on such a layer could sink into the ground. Other effects of liquefaction include lateral spread, flow failures, ground oscillations, and loss of bearing strength (Tinsley et al, 1985). Because liquefaction occurs in sediments, areas of bedrock are not considered liquefiable.

Lateral spread is the movement of blocks of ground as a result of liquefaction in a subsurface layer. During liquefaction of a subsurface layer of sediment into a fluid mass, gravity can cause the mass to flow down slope. Examples of this include movement into a cut slope such as a river channel, irrigation channel, or a storm drain. Lateral spread typically occurs on gentle slopes ranging from 0.3° to 3°. Ground movement of several feet to tens of feet are possible. Lateral spread is particularly destructive for pipelines, utilities, bridge piers, and other structures having shallow foundations.

Ground oscillation may take place where liquefaction occurs at depth and where the ground slope is too gentle for lateral spreading. When deeper zones liquefy, overlying sediment that are not liquefied can decouple and differentially move. The result is a ground wave; ground settlement and opening and closing of fissures are manifestations of ground oscillation.

Flow failure occurs when blocks of ground are decoupled from underlying sediment and move downslope. Flow failures occur on slopes greater than 3°. These blocks can be quite large, from tens of feet to several miles in length and width. Underwater flow failure can also generate in tsunamis. Flow failures comprise the greatest hazard produced by liquefaction.

Loss of bearing strength can occur under a structure when the underlying soil liquefies. Large movement in the soil column is possible, allowing for structures to settle, tip, or float upwards.

Because liquefaction occurs under certain conditions, by understanding these conditions, the potential for liquefaction can be determined. Conditions that favor liquefaction include areas of young (recently deposited) sediments, the looseness of cohesionless soil, and the depth to groundwater.

Because of a tendency for young sediments to be poorly consolidated, recently deposited material, such as river and flood plain deposits, are more susceptible to liquefaction than other types of sedimentary deposits. The distribution of sediment grain size also influence the susceptibility of liquefaction. Silty sand deposits have the greatest potential for liquefaction. Gravely sand or deposits having less than 15 percent clay are susceptible to liquefaction, whereas bouldery and cobbly gravels or deposits containing more than 15 percent clay are not known to liquefy (Tinsley et al, 1985).

Depth to groundwater influences the susceptibility for liquefaction. Where groundwater is within 10 feet from ground surface, the susceptibility is very high. For groundwater between 10 and 30 feet, the susceptibility is high. For groundwater at 30 to 50 feet below grade, the susceptibility is low, and for groundwater deeper than 50 feet, the susceptibility is very low.

The magnitude and duration of ground shaking also has an influence on the susceptibility of liquefaction. The larger the magnitude of an earthquake, the greater the distance at which liquefaction is observed. Similarly, the longer the duration of shaking, the greater the distance at which liquefaction is observed.

Hazard Analysis. Much of the City of Thousand Oaks lies on bedrock, thus, is not susceptible to liquefaction. Areas of the City underlain by unconsolidated alluvium, such as along canyons and the floor of the Conejo Valley, may be susceptible to liquefaction. As shown in Section 1.3.6 of this document, ground water levels in the Conejo Valley Basin fluctuate considerably -- being highly dependent on rainfall. In the past five years, it appears that much of the basin may have had ground water levels within about 10 to 20 feet from ground surface. Thus, based on groundwater depths only (and not taking into account soil composition), the entire alluvial basin may be susceptible to liquefaction during periods of relatively high rainfall. In areas where the subsurface sediments have a high clay content (greater than 15%) or are very coarse grained (cobbles or boulders), the susceptibility to liquefaction would be decreased. No detailed liquefaction studies have been performed for the Thousand Oaks area.

Plate 1 depicts areas within the Planning Area with a moderate to high liquefaction hazard potential. This data is based on previous mapping by Leighton and Associates (1974). Based on recent groundwater data, it is possible that other areas could also be susceptible to liquefaction. Accordingly, all other alluvial mapped areas shown on Plate 1 are judged to have a low to moderate liquefaction hazard potential.

To more accurately determine the potential for liquefaction, site specific geologic studies are required. These studies should be performed in areas with a moderate to high liquefaction potential prior to new construction and for the retrofitting of critical facilities. The studies should include site specific depth to groundwater and stratigraphy of the underlying sediments. Areas having liquefiable sediments should be identified, and structures should be properly designed to withstand the conditions.

Conclusions. Areas of unconsolidated alluvium and shallow groundwater exist within the City of Thousand Oaks. In such a setting, there is a potential for liquefaction to occur. Factors that influence liquefaction include soil composition (sand, silt, clay, cobbles, boulders), seismically induced ground shaking intensity, duration of ground shaking, and depth to groundwater. Plate 1 depicts areas of moderate to high liquefaction potential and areas of low to moderate liquefaction potential. Detailed liquefaction analyses are necessary to evaluate the site specific liquefaction potential. Such a study should be performed prior to development within areas mapped as having a moderate to high potential for liquefaction.

1.3.4 Slope Stability (Landslides, Debris Flows, Rockfalls, and Mudslides)

Introduction. Landslides, debris flows, rockfalls, and mudslides all occur within the planning area. All are manifestations of gravity driven flows of earth materials due to slope instability. Hill slopes naturally have a tendency to fail. Unless engineered properly, development in hillside areas tends to increase the potential for slope failures. Slope modification by grading, changes in the infiltration of surface water, and undercutting slopes can create unstable hill slopes, resulting in landslides or debris flows.

Much of the City of Thousand Oaks is comprised of topographically pronounced areas. These hill slopes and mountains consist of sedimentary and volcanic rock outcrops that are locally covered with soil. Slope instability is of greatest concern in these topographically pronounced areas. The majority of landslide and slope wash problems in the Thousand Oaks area occur in geologic terranes involving folded sequences of clay shale, siltstone, and very fine-grained sandstone of the Monterey (Modelo) and Topanga Formations - especially in north facing slopes. These fine-grained units are easily eroded, resulting in the undermining of slopes which then tend to fail. If the slopes are unstabilized, seismically induced ground shaking can trigger the landslide movement.

Several landslides are depicted on geologic maps of the Thousand Oaks area (Weber, 1984; Diblee, 1990 and 1993; Yerkes, 1991). The largest ancient landslide mapped in the planning area

is in the vicinity of Lang Ranch and is commonly referred to as the Erbes Road landslide. This bedrock landslide encompasses about 230 acres and involves slightly folded and contorted but mostly gently dipping shale bedrock of the Monterey (Modelo) Formation (Weber, 1984).

Debris and mud flows often occur after periods of precipitation. Water soaked soil and rock are destabilized by the weight of the water. Often compounding the added weight is erosion of the base of a hill slope. Once this slope becomes destabilized, the water, soil, and mud mass is driven downhill by gravity. Numerous mud and debris flows occurred during the very heavy rains of January 1969. One death was attributed to these incidents.

Rockfalls occur in virtually all types of rocks and especially on slopes steeper than 40^0. Areas of primary risk from rockfalls are those located at the base of steep, high slopes where rock outcroppings (usually Conejo Volcanics) are susceptible to dislodgment of large boulders. These conditions are locally present along the northwest, west and south margins of the planning area. Rockfalls are usually triggered by seismically induced ground shaking or by erosional destabilization of a hill slope.

Hazard Analysis. Numerous landslides have been mapped within the hillsides of the City of Thousand Oaks (Weber, 1984; Diblee, 1990 and 1993; Yerkes, 1991 -- See Plate 1). The hillsides also are prone to rockfalls, mudflows, and debris flows. Because many factors contribute to the instability of hill slopes (precipitation, soil and rock lithology and induration, seismic ground shaking, steepness of slope), the Uniform Building Code (UBC, 1991) requires that site specific investigations be performed for development on hillsides. These include:

- *requiring preliminary studies by qualified geotechnical engineers and engineering geologists*
- *requiring developers to retain both engineering geologists and geotechnical engineers during construction*
- *requiring certification as to the stability of the proposed building site to adverse effects of rain and earthquakes prior to the issuance of building permits*
- *assuring the coordination between the civil engineer and the project engineering geologist/geotechnical engineer during the supervision of construction grading*
- *requiring the mitigation of onsite hazards caused by grading that may affect adjacent properties, including erosion and slope instability*

Areas having the potential for landslides, debris flows, rockfalls, or mudslides are depicted on Plate 1 within sedimentary and volcanic rock sequences. These areas represent generalized risk zones. Development within these areas should follow the appropriate UBC criteria and site specific studies should be performed prior to development.

Conclusion. Numerous landslides have been mapped within the hillsides of the City of Thousand Oaks. These hillsides also pose a high risk of debris flows, mudflows, and rockfalls. Land development near or at the base of canyons, cliffs, or landslides should take these hazards

into consideration during the planning, construction and life of the development. Site specific geologic studies should be conducted and measures should be implemented, as appropriate, to mitigate potential impacts associated with these geohazards. Slope stability hazards encountered during the construction phase should be mitigated to minimize future problems.

1.3.5 Soil Related Hazards

Soil related hazards include expansive soils, settlement, subsidence, and hydrocompaction. This section focuses on areas within the City of Thousand Oaks that have the potential for such failure.

1.3.5.1 Expansive Soil

Introduction. Expansive soils are those that are characterized as having a high shrink-swell potential (Edwards, 1970). The shrink-swell potential of a soil refers to the change in volume resulting from a change in moisture content. Soils with high shrink-swell potential generally have a high clay content and shrink when dry and swell when wet. Expansive soils can cause considerable damage to building foundations, roads, and other structures. Soils with low shrink-swell potential are generally suitable for building sites if other geologic factors are also favorable.

In the late 1950s and 1960s, numerous cracked concrete slabs for residential houses in the Thousand Oaks area were attributed to expansive soils. It was believed that soils with the highest shrink-swell properties were those derived from clay-rich formations such as the Topanga and Monterey (Modelo) Formations, old lake deposits, and certain volcanic rock types (Leighton and Associates, 1974).

Detailed studies of soil properties, including shrink-swell potential, were conducted in the soil survey of Ventura County (Edwards et al, 1970). According to Weber (1984), the soil units depicted in the soil survey maps do not correlate well with geologic maps of the area. This apparent lack of correlation illustrates that the elements that cause expansive soils are more complex than thus far shown by either soils studies or by geologic mapping.

Hazard Analysis. Plate 1 presents areas of potentially highly expansive soils. The area mapped corresponds with known alluvial soils. This area generally agrees with areas of highly expansive soils as mapped in the Soil Survey of Ventura County (Edwards et al, 1970). However, because of the apparent complexity of factors affecting soil expansiveness, the mapped areas are estimates only. Detailed site specific investigations are required to fully evaluate the shrink-swell characteristics of soils at a given site.

Conclusions. The potential for expansive soils exists in the City of Thousand Oaks. The shrink-swell characteristics of soils can vary widely with short distances, depending on the relative amount and type of clay. Detailed geologic studies are required prior to development to evaluate the potential for expansive soils. If a site is found to have expansive soils, this can usually be

mitigated through proper foundation design. The more expansive the soil and the more extensive the soil on the site, the greater the construction costs.

1.3.5.2 Settlement

Introduction. Settlement is the downward movement of a soil or of the structure which it supports, resulting from a reduction in the voids in the underlying strata. Inadequately emplaced fill material, if not compacted properly, can subside when a structure is built on the fill. It is important that fills be engineered so that the density of the material can be controlled. This will result in a lesser chance that the material will compact following development on the fill. Natural soils that are potentially susceptible to settlement can be found in the alluvial valley areas and where old pits or gullies have been filled in with trash and loose soil (Leighton and Associates, 1974).

Hazard Analysis. Settlement hazards can occur in areas with alluvial deposits (alluvial deposits depicted in Plate 1). Large-scale settlement problems have generally not been an issue in the study area provided that adequate soils and foundation studies are performed prior to construction and that UBC guidelines are followed. Areas of poorly consolidated sediments should be engineered to support the weight of a structure that is to be built on the site. In areas of fill, the fill should be compacted to adequately support the proposed development.

Conclusion. Although settlement problems have not historically been a significant issue in the study area, the potential for settlement should be addressed during geotechnical studies and appropriately minimized or corrected, as necessary, during construction.

1.3.5.3 Subsidence

Introduction. Subsidence is the decrease in volume of a material as the result of an increase in the density of a material. It is generally related to the withdrawal of fluids such as water, oil, and gas from the subsurface. When fluids are removed from the subsurface, the overburden weight, which the water had previously help support through buoyant forces, is transferred to the soil structure. Subsidence typically occurs over a long period of time and results in a number of structural impacts. Facilities most impacted by subsidence are long, surface infrastructure facilities -- such canals, sewers and pipelines.

Hazard Analysis. As yet, no recognized subsidence has occurred within the study area even during periods of heavy ground water pumping (see ground water conditions section) in the 1950s and 1960s. Accordingly, the potential for subsidence in the study area is considered to be minimal. If present, these hazards would be manifested in areas of unconsolidated alluvium (alluvial deposits depicted in Plate 1).

Conclusions. Large-scale regional subsidence has not occurred in the study area. Because of the limited amount of ground water currently being extracted from the basin, and the probability of negligible future oil production, the likelihood of significant subsidence occurring in the study area is considered very minimal.

1.3.5.4 Hydrocompaction.

Introduction. Hydrocompaction occurs in relatively loose, open textured soils above the groundwater table. Once water is introduced, whether by heavy irrigation or a rise in the water table, the soil loses strength and consolidates under its own weight. Hydroconsolidation typically occurs in desert environments and has been noted in some semi-arid regions of southern California.

Hazard Analysis. Areas of hydrocompaction have not been identified within the City of Thousand Oaks. If, during the preparation of a foundation study, soils susceptible to hydrocompaction are encountered, the condition should be mitigated prior to development. Mitigation measures should be designed by a civil or geotechnical engineer.

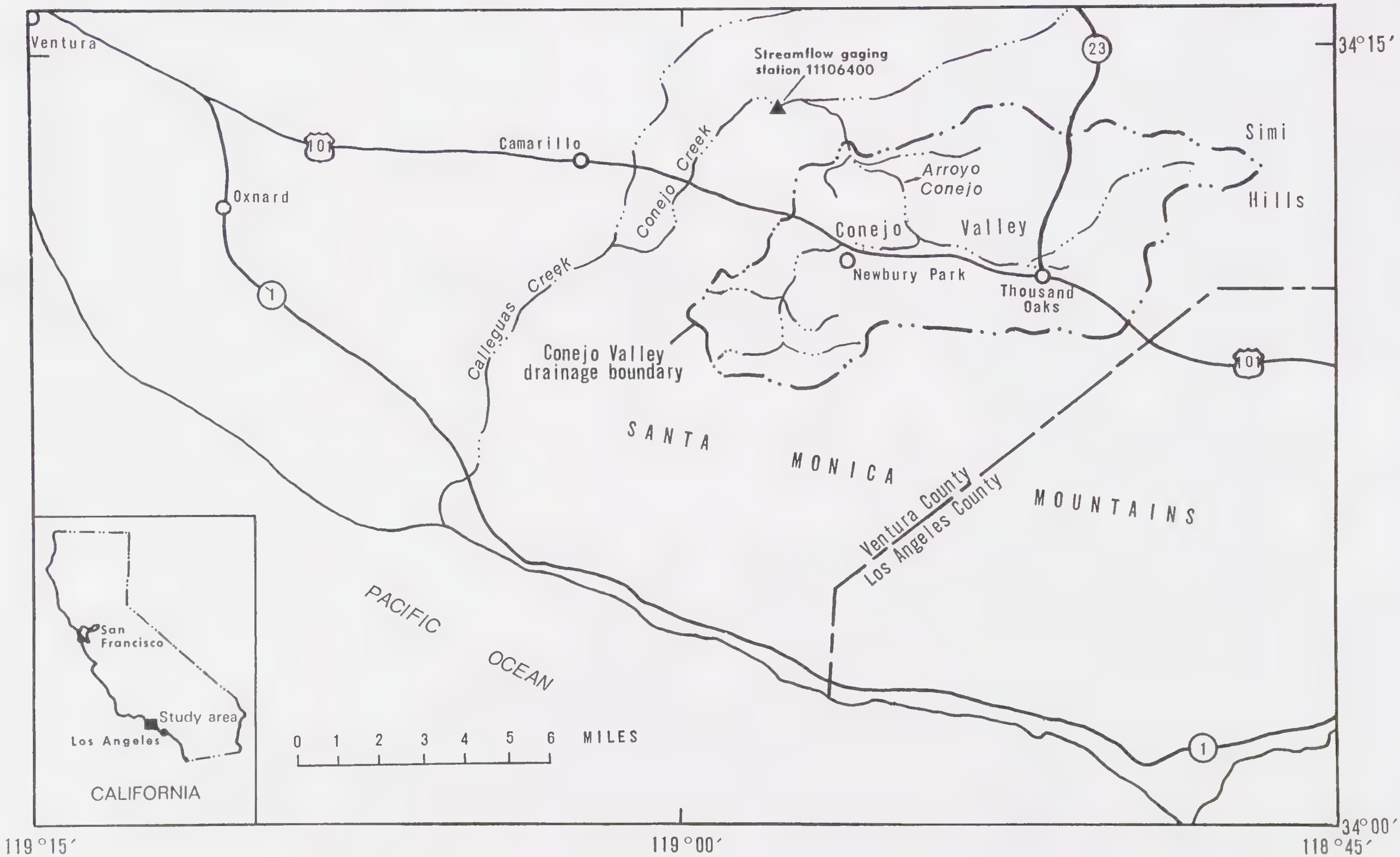
Conclusion. Hydrocompaction could potentially occur in areas of unconsolidated soils (see Plate 1). If, during the performance of geotechnical studies, areas having the potential for hydrocompaction are encountered, these areas should be mitigated prior to development.

1.3.6 Ground Water/Seepage Hazards

Introduction. The ground water basin beneath the City of Thousand Oaks closely corresponds with the surface watershed basin of the Arroyo Conejo which is about 45 square miles (French, 1980; Kennedy/Jenks, 1992). The approximate basin boundaries are shown in Figure 1-6. The ground water is unconfined and flows northward from the Santa Monica Mountains, westward from the Simi Hills, and eastward from the western ridges of the basin. Ground water exits the basin through base flow of the Arroyo Conejo. About 2,000 acre feet per year of ground water flows from the base annually.

Most of the ground water is stored in Quaternary alluvium (seldom thicker than 100 feet), which blankets much of the floor of the Conejo Valley, and fractured basalt of the middle Miocene Conejo Volcanics. Potential recoverable ground water is present in the upper 300 to 500 feet of strata. Well yields range from 17 to 1,080 gpm.

Ground water has historically been extracted from the basin for agricultural and domestic purposes. Increased urban development following World War II overstressed the basin with wells being drawn down by as much as 300 feet. In 1963, imported water replaced domestic and municipal ground water systems, and ground water levels generally recovered to their pre-development levels.



Drainage Basin - Thousand Oaks Area

Figure 1-6

The Ventura County Public Works Agency, Water Resources Division regularly monitors ground water levels in 4 wells (03J01, 07K16, 15E01, and 14K04) located within the Conejo Valley Basin. During a five year period from January 1990 through April 1995 ground water levels fluctuated in these wells as shown in Table 1-3:

Table 1-3 Ground Water Level Fluctuations, Conejo Valley Basin, 1990-1995

Well No.	Location	Minimum Depth to Ground Water (feet)	Maximum Depth to Ground Water (feet)	Range (feet)
03J01	Old Conejo Rd. and U.S. 101	12.9	72.9	60
07K16	Ventu Park Rd. and U.S. 101	0.7	12.8	12.1
15E01	South of intsc. of Hwy 23 and U.S. 101	10.2	26.8	16.6
14K04	U.S. 101, West of Hampshire Rd.	18.8	26.9	8.1

Source: Ventura County Public Works Agency, Water Resources Division

The depth to ground water in the four wells has fluctuated by between 8.1 and 60 feet. Deeper water levels generally correspond with low rainfall periods and shallower levels correspond with periods of high rainfall. Ground water has been within 20 feet of the ground surface in all four wells during the previous five years.

Hazard Analysis. Surfacing ground water has appeared primarily in two subdivisions in the Thousand Oaks area, requiring remedial measures to mitigate potential foundation problems (Leighton and Associates, 1974). Areas with historical problems include the area in the vicinity of Lynn and Gainsborough Roads, and Lynn Road at Avenida de Los Arboles. These areas are shown on the Geologic Hazards Map (Plate 1). These seepage areas have been attributed to natural ground water barriers, possibly associated with faulting or a perched water zone intercepted in a cut for development grading.

Structural distress associated with the seepage condition (Leighton and Associates, 1974) in the Lynn Road and Avenida de Los Arboles area (Tract 1499) has primarily involved cracking of swimming pools, patio and house slabs, garden walls, curbs and sidewalks. Geologic and soil investigations in this area have attributed the distress to one or more of the following causes: expansive soil; poor quality natural earth materials subject to consolidation, settlement or downhill creep; or instability subject to consolidation, settlement or downhill creep; or instability resulting from the possible presence of ancient landslide deposits.

Conclusion. The potential for seepage problems should be addressed during geotechnical studies and appropriately minimized or corrected, as necessary, during construction. Areas of

known seepage problems are depicted on the geohazards map (Plate 1). Prior to any development in these problem areas, geotechnical investigations that specifically address this problem issue should be conducted. Projects should be specifically designed to mitigate seepage problems.

2.0 FLOODING

Development within the Thousand Oaks Planning Area is primarily on the Conejo Valley floor and on slopes less than 25% (Hawks and Associates, 1992). The watershed is defined by the Santa Monica Mountains to the south and the Simi Hills on the north and east. The Arroyo Conejo is the major drainage feature through the City. This watercourse and the South Branch tributary drain from the eastern and southeastern limits of the watershed, westerly through the Santa Rosa Valley. Flow proceeds to Conejo Creek and then to Calleguas Creek through the Oxnard Plain and into the Pacific Ocean. Major tributaries of the Arroyo Conejo include Olsen Channel, North Fork Arroyo Conejo and Lang Creek. Southeastern portions of the City, including the Westlake area, drain into Los Angeles County (to Malibu) via Lindero Creek, Schoolhouse Canyon and Potrero Creek.

2.1 HISTORIC FLOODING

Table 2-1 provides a listing of major flood events that have occurred in Ventura County over the previous 25 years.

Table 2-1 Major Flood Events in Ventura County

Date	Comments
1973	State declared disaster
Feb. 9-10, 1978	Presidentially declared disaster
February 16, 1980	Presidentially declared disaster; 4-day storm event
March 1, 1983	Presidentially declared disaster; peak flow on record in Zone III
February 10-12, 1992	Presidentially declared disaster; 50-year flood event
January 10, 1995 and March 10, 1995	Presidentially declared disaster; 10-13 million dollars in damage from the combined storms

Source: County of Ventura, Flood Control Department

During the February 10-12, 1992 storms, heavy rainfall in Calleguas Creek Watershed produced runoff in Conejo Creek which rose to bank full stage (Ventura County Public Works Agency, 1986). Within the City of Thousand Oaks, a box culvert that crosses under Erbes Road (Lang Ranch area) was unable to adequately convey the storm flow (personal communication - Dolores Taylor, County of Ventura, Flood Control Department). This resulted in flooding of the park area adjacent to the Old Meadows Conejo Recreation and Park District Offices, threatening some of the nearby homes. During this same event, a clogged drain in the vicinity of Newbury Road and Ventu Park Road resulted in 4 to 5 feet of ponding and localized flooding. The clogged drain was the result of debris from recently cut Pepper trees that had been stored on an adjacent private property and were swept into the drain during a rainstorm.

During storms of early 1995, there was extreme high flow of Potrero Creek (between Lake Sherwood and Westlake Lake). The high flows in the creek damaged a wing wall adjacent to a

bridge on Triunfo Canyon Road (personal communication - Kurt Reithmayr, City of Thousand Oaks, Public Works Department).

2.2 FLOOD HAZARDS

Flood hazard areas of the City of Thousand Oaks are subject to periodic inundation which can result in destruction of property and improvements to the property, loss of life, health and safety hazards, and disruption of commerce and governmental services. Encroachment onto floodplains, such as artificial fills and structures, reduces the capacity of the floodplain and increases the height of flood water upstream of the obstructions. Floodplain management involves the balancing of economic gain associated with land development within the floodplain against the increased flood hazard.

The Federal Emergency Management Agency (FEMA) establishes base flood heights and inundation areas for 100-year and 500-year flood zones. The 100-year flood zone is defined as the area that could be inundated by the flood which has a one percent probability of occurring in any given year. The 500-year flood is defined as the flood which has a 0.2 percent probability of occurring in any given year.

Figure 2-1 illustrates areas of the City that could be inundated by the 100-year flood (FEMA, 1983). The large floodplain area between the 101 Freeway on the north and Borchard Road on the south is the largest floodplain in the County where people live (personal communication with Dolores Taylor of Ventura County Flood Control).

A Master Plan of Drainage was prepared for and adopted by the City in 1974 (Koebig and Koebig, Inc., 1974). The original study encompassed about 29,000 acres lying entirely within the watershed of the Arroyo Conejo. To account for ensuing geographic expansion of the City, an updated Master Plan of Drainage was prepared and adopted by the City in 1992 (Hawks and Associates, 1992). The updated study (encompassing about 45,000 acres) expanded easterly toward the Ventura-Los Angeles County line, southerly to include portions of Westlake within the City limits, and northerly to Moorpark Road and Read Road. The updated study proposes a planned program of drainage facilities required to provide a reasonable degree of protection from flooding with respect to existing anticipated land uses, including no inundation of building pads in a 100-year storm and underground system carrying capacity for a 10-year storm.

Both the Master Plan of Drainage and the update to the Master Plan of Drainage (Koebig and Koebig, Inc., 1974 and Hawks and Associates, 1992) identified citywide improvements necessary to alleviate existing and future problems with flooding. One of the more prominent "problem areas" identified was the Lang Creek and proposed development upstream at Lang Ranch. Lang Creek has a history of flooding problems, notably at the El Monte and Las Flores drains, and at the Erbes Road undercrossing (Michael Brandman Associates, 1994). Flood waters have reportedly backed up onto the roadway and adjacent residential properties at the latter location as a result of deficient drainage capacity. A master environmental impact report prepared for the

Lang Ranch development in 1988 concluded that the existing downstream flood control channels had inadequate hydraulic capacity, and that continued development would exacerbate the problem. Under a federal judgment, the developers of Lang Ranch are required to build a stormwater retention and debris basin in the lower portion of Oakbrook Community Park between Erbes Road and Westlake Boulevard.

A follow-up study to the Master Plan of Drainage indicated that there are some deficiencies in the existing flood control system (Clearpoint Engineering, 1994). The Erbes Road Drain, Thousand Oaks North Drain and Arroyo Conejo Red Line Drainage facilities between Lynn Road and Hillcrest Drive (near Westlake Boulevard) comprise the backbone drainage system for the Thousand Oaks area, totaling approximately 35,000 feet in length (see Figure 2-1). These facilities were constructed during the period of 1966 to 1988, with the majority of the facilities constructed before 1976. Portions of these facilities have been identified as being deficient in carrying capacity for a 10-year storm. Problem areas as shown in Figure 2-1 include:

> **Arroyo Conejo**: from Boardwalk Avenue to approximately 2,740 feet downstream; from approximately 800 feet upstream of Conejo School Road to 1,000 feet downstream of Erbes Road; and from approximately Duesenberg Drive to 2,500 feet upstream.
>
> **Erbes Road Drain**: approximately 250 feet north of Thousand Oaks Boulevard and extending 1,400 feet upstream.
>
> **Thousand Oaks North Drain**: approximately 250 feet downstream of La Jolla Drive to 250 feet west of the easterly tract boundary.

The Clearpoint Engineering Study (1994) recommended that the following be implemented:

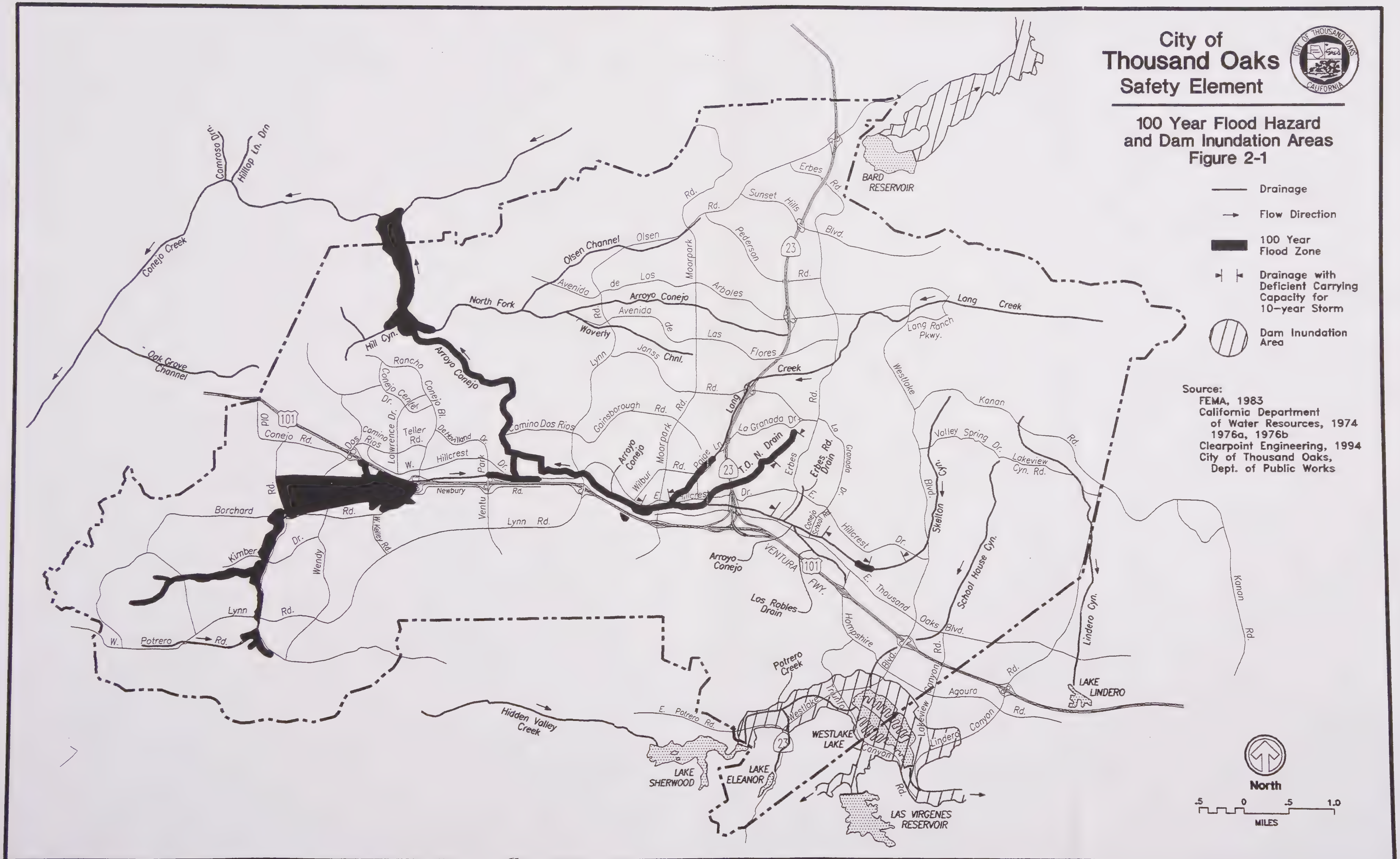
1. A deficiency study should be performed to identify and prioritize both City and Flood Control facilities that are the most critical to the operation of the City drainage system.

2. The Master Plan of Drainage should be updated periodically to reflect changed conditions in land use and inflationary trends in the cost estimates of the master plan facilities.

3. City representatives should periodically should contact federal and state representatives and agencies to remain current on the various methods available to finance storm drainage construction.

4. Existing Facilities Maps should be maintained as an inventory and updated as new drainage facilities are constructed in the study area.

5. The hydrologic computation materials, including the data files on computer disk, should be filed and maintained for future references and adjustments as land uses and hydrologic data change.



Rincon Consultants

2.3 FLOOD CONTROL AND PREVENTION

Flood hazards may be alleviated through a variety of measures, some corrective and some preventive. Corrective measures include warning and relief programs, flood-proofing of existing structures, and the construction of flood control works. Preventive measures include public acquisition of flood plain lands, public information programs, development policies and regulations.

Protecting life and property from flood damage is the responsibility of the Ventura County Flood Control District. The Flood Control District has the authority to maintain and construct flood control facilities on all major channels shown on Figure 2-1. The network of tributary storm drain trunks and laterals that collect and convey surface water from the urban areas to the major channels is the responsibility of the City. Section 4-7.05 of the Municipal Code prohibits encroachments, including fill, new construction, substantial improvements, and other development unless certification by a registered professional or architect is provided demonstrating that encroachments shall not result in any increase in flood levels during the occurrence of the 100-year flood.

On the Federal level, the regulations of the National Flood Insurance Program (NFIP), which is administered by the Federal Insurance Administration (a component of the Federal Emergency Management Agency), require that communities adopt land use restrictions for the 100-year flood plain in order to qualify for Federally-subsidized flood insurance. The program requires that residential structures be elevated above the level of the 100-year flood and that other types of structures be floodproofed. The NFIP was established by Congress with the passage of the National flood Insurance Act of 1968. The NFIP was broadened and modified with the passage of the Flood Disaster Protection Act of 1973 and other legislative measures.

To provide for early flood warning, the Ventura County Flood Control District has been operating an automated flood warning system since 1979. The system is known as "ALERT" (Automated Local Evaluation in Real Time) and was developed by the National Weather Service in Sacramento, California. The system is comprised of self-reporting rain gages and stream gages that collect data and transmit signals to a flood warning center computer system located in the County Government Center Administration Building in Ventura. Operators of the system compare rainfall forecasts with the runoff forecasts from the hydrologic models and notify proper authorities in threatened areas to initiate evacuation warnings as appropriate. In the Thousand Oaks area, self reporting stations are located at Lang Ranch (wind, precipitation, humidity, and temperature) and at Conejo Creek above Highway 101 (stream level and precipitation).

2.4 POTENTIAL INUNDATION DUE TO DAM FAILURE

Introduction. The State of California has been responsible for supervising dams since August 14, 1929 for the purpose of safeguarding life and protecting property (California Department of Resources, 1995). The legislation was enacted following the failure of St. Francis

Dam in March 1928. In 1965, legislation was revised to include off stream storage reservoirs as result of the failure of Baldwin Hills Reservoir in December of 1963. In March 1973, Senate Bill 896 was adopted by the State of California amending the Government Code. This law required dam owners, under the direction of the Office of Emergency Services, to show the possible inundation below their dam in the event of a failure.

Five dams in the Thousand Oaks area have the potential to result in inundation (in the event of a dam failure) to the City or surrounding environs or in a serious disruption of water supply. These include Lake Sherwood, Westlake Lake, Westlake (Las Virgenes) Reservoir, Lake Eleanor, and Wood Ranch (Lake Bard). General information for each of these dams is discussed below and is summarized in Table 2-2. Areas of dam inundation (California Department of Water Resources, 1974, 1976a, and 1976b) are depicted on Figure 2-1.

Lake Sherwood Dam is a constant radius concrete arch dam operated by Lake Sherwood Ranch (Jensen Engineering, 1975). Lake Sherwood Dam is one of the oldest concrete dams in the State, constructed in 1902. The reservoir has a drainage area of 16.1 square miles. Normal operation is at 100% capacity. Storm inflows are not impounded, and are passed over the main arch dam to Potrero Valley Creek. Under a worst-case scenario, Lake Sherwood Reservoir could fail by sudden removal of the concrete arch dam, resulting in a very high discharge in a short period of time. The area impacted in the event of a failure would be the Westlake area of the City of Thousand Oaks.

Potrero Dam (Westlake Lake), which impounds Westlake Lake, is a gravity dam operated by Westlake Lake Management. The reservoir has a relatively large drainage area of 28.9 square miles, but is maintained near full condition for recreational purposes, and thus, flood flows are bypassed downstream.

Westlake Dam (Las Virgenes Reservoir) is a compacted earth fill dam operated by Las Virgenes Municipal Water District. The reservoir has a small drainage area of only 0.9 square miles. Runoff into the reservoir is relatively insignificant compared to its capacity to store water conveyed to it from other sources. The County line and Westlake areas would be impacted in the event of a failure of this dam.

Banning Dam (Lake Eleanor) is a constant radius arch dam operated by Conejo Open Space and Conservation Agency. The reservoir has a relatively small capacity of 128 acre-feet, although this capacity has been diminished with siltation (about 80% infilling). The area impacted in the event of a failure would be the Westlake Boulevard area to Westlake.

Wood Ranch Dam (Bard Reservoir) is an earth fill dam operated by Calleguas Municipal Water District. The reservoir has a small drainage area of 0.97 square miles. Runoff is into the Simi Valley area. The cities of Simi Valley, Moorpark, and Camarillo could potentially be affected by a failure of this dam.

Hazard Analysis. Failure of any of the above referenced dams during a catastrophic event, such as an earthquake, is considered possible but unlikely. According to the California Department of Water Resources (DWR), Division of Safety of Dams (letter dated September 28, 1995), Lake Sherwood Dam and Westlake Reservoir Dam are believed to be stable under seismic loading from a maximum credible earthquake of Magnitude 7.0 occurring on the Malibu Coast Fault, located about seven miles from these structures. According to the DWR, Wood Ranch

Table 2-2 Dams in the Thousand Oaks Area

Name	Year Completed	Type of Dam	Storage Capacity (A-Ft)	Height (feet)
Lake Sherwood	1904	Constant Radius Arch (concrete)	2,600	45
Potrero Dam (Westlake Lake)	1967	Concrete Gravity Dam	791	40
Westlake (Las Virgenes) Reservoir	1972	Earth Embankment	9,200	158
Banning Dam (Lake Eleanor)	1889	Constant Radius Arch (concrete)	128	37
Wood Ranch (Lake Bard)	1965	Earth Embankment	11,000	146

Source: Department of Water Resources, Division of Safety of Dams
Envicom Corporation - City of Westlake Village General Plan, Hazards section.

+

Dam is believed to be stable under seismic loading from a maximum credible earthquake of Magnitude 7.0 occurring on the Santa Rosa-Simi Fault located two miles from the dam.

Failure of Potrero Dam and Wood Ranch Dam would result in flows away from the City of Thousand Oaks and would not be expected to inundate areas of the City's Planning Area.

Failure of Lake Sherwood Dam would cause significant flooding between the dam and Westlake Lake, and would cause the level of the lake to rise several feet. Failure of Banning (Lake Eleanor) Dam would impact the Westlake Boulevard area to Westlake. A critical facility located in the inundation path of Lake Sherwood Dam and Lake Eleanor Dam is Westlake Elementary School located at Westlake Boulevard and Potrero Road (see Figure 5-1 in later section of this document).

Failure of Westlake Reservoir Dam would result in flow into Westlake Lake, potentially expanding the perimeter of the lake by about 1,000 feet (City of Thousand Oaks, Emergency Operations Plan). Water levels could rise by 16 feet in the event of a sudden and total failure.

Conclusions. Failure of Lake Sherwood Dam, Westlake Reservoir Dam, or Lake Eleanor Dam could have significant inundation impact on the Westlake area of Thousand Oaks. One of the best criteria for evaluating dam/reservoir safety and inundation risk is compliance with State Standards. Annual safety inspections are conducted by the State. Operational and maintenance recommendations must be adhered to by the dam owner in order to remain in compliance with State safety standards. Emergency response actions associated with a dam failure are specified in the City of Thousand Oaks Draft Emergency Operations Plan.

Although the dams in question have been certified for safety, the location of critical and high risk facilities in potential inundation areas may pose an unacceptable risk, regardless of the likelihood for dam failure.

3.0 FIRE HAZARDS

3.1 URBAN FIRE HAZARDS

3.1.1 Fire Prevention and Suppression

Fire prevention and suppression services are provided to the City of Thousand Oaks by the Ventura County Fire Protection District. The Fire Protection District is responsible for enforcing the following:

- *California Health and Safety Code, Division 12, Part 2.7 (Fire District Law) and Part 5 (Abatement of Hazardous Weeds and Rubbish).*
- *Ventura County Fire Protection Ordinance 22 (Adopting the Uniform Fire Code).*
- *Ventura County Fire Protection District Ordinance 22 (Clarifying the definition of Combustible Material).*
- *Uniform Fire Code, Article 11, Section 1103.4, Fire Hazard Abatement.*

The District has a number of mutual aid agreements with other fire services agencies within Ventura and Los Angeles Counties. If the resources of these agencies are depleted, assistance can also be obtained through various state agencies including Office of Emergency Services, the Department of Forestry and Fire Protection, the State Fire Marshall, and the Department of Fish and Game; and various Federal agencies including the U.S. Forest Service, the National Park Service and Bureau of Land Management, and the Department of Defense. Urban fire hazard abatement is discussed in this section and Wildland fire hazard abatement is discussed in the following section.

The Fire Department responded to 4,795 incidents in the City of Thousand Oaks in 1994. Fire services consisted of that specified in Table 3-1.

3.1.2 Existing and Proposed Fire Stations

The Ventura County Fire Protection District currently operates 30 fire stations throughout Ventura County, seven of which serve the Conejo Valley (Battalion 30). The Valley is well served by fire stations, with virtually all developed areas within two miles of a station [see Critical Facilities section (Section 5.1) for a map of fire stations in the Thousand Oaks area]. The District maintains a 6.5-minute response goal for any incident within the City. Emergency medical aid responses were 3,037, comprising 63% of the total incidents.

Table 3-2 provides a summary of the local fire stations capabilities (personnel and equipment). In addition, depending on the nature of the emergency, four other stations may be called into service

for the Thousand Oaks area. These include two stations north of the City (Station 40-Mountain Meadows in Moorpark and Station 44 Wood Ranch in Simi Valley) and two stations west of the City (Station 52-Mission Oaks and Station 54 Camarillo, both in Camarillo). Additionally, in the event of a very large incident, all available equipment and manpower can be called into the Conejo Valley 24 hours a day.

Table 3-1 Incident Activity Summary - 1994, Thousand Oaks

Fires/Incidents	Number of Incidents	Hours Expended
Buildings	63	2,102
Vegetation	44	717
Vehicle	119	316
Refuse	62	494
Other	21	39
TOTAL FIRES	309	3,668
Emergency Medical	3,037	5,126
Hazardous Material Incidents	205	619
Other	1,244	1,861
TOTAL INCIDENTS	4,795	11,274

Source: Ventura County Fire Suppression District, 1995

There are plans to relocate Fire Station No. 35 to the Seventh Day Adventist site off Wendy Drive in the Newbury Park area of the City of Thousand Oaks. This project has been approved and the relocation is anticipated to be complete in a couple of years. One additional station is proposed for the North Ranch area. However, there is presently no schedule for its construction.

Station 40 (Mountain Meadows - in Moorpark) is the designated HazMat Station for the Thousand Oaks area. Personnel assigned to this station are specifically trained to respond to hazardous materials incidents. Equipment available include specially outfitted HazMat trucks and trailers.

Three of the fire stations referenced in Table 3-2 were constructed prior to the enactment of strict seismic structural codes and may be subject to significant earthquake damage in the event of a large earthquake. Stations 33, 34, and 35 were constructed prior to the San Fernando Earthquake of 1971, when building codes did not call for stringent structural requirements. Fire stations are considered critical facilities that must be functional in the event of an earthquake or other disaster to minimize loss of life and property damage. These stations may need to be retrofitted to meet seismic structural codes.

3.1.3 Peakload Water Requirements

Peak load water supply standards ensure that sufficient water flow is available to fight fires. The

Table 3-2 Fire Station Capabilities

Station No.	Year Built	Location	Personnel	Equipment
30	1974	Civic Center 325 W. Hillcrest Drive	1 Battalion Chief 2 Captains 2 Engineers 3 Firefighters	1 Engine Company 1 Ladder Truck Company (95 ft aerial) 1 Reserve Truck
31	1977	Westlake 151 Duesenberg Drive	1 Captain 1 Engineer 1 Firefighter	1 Engine Company 1 Reserve Engine
32	1972	Potrero 830 S. Regno Rd	1 Captain 1 Engineer 1 Firefighter	1 Engine Company 1 Reserve Engine 1 Tractor 1 Super Vac. Trailer 1 4x4 Patrol Vehicle
33	1949	Lake Sherwood 25 Lake Sherwood Drive	1 Captain 1 Engineer 1 Firefighter	1 Engine Company 1 4x4 Patrol Vehicle
34	1961	Arboles 555 Avenida De Los Arboles	1 Captain 1 Engineer 1 Firefighter	1 Engine Company 2 Reserve Engines 1 4x4 Utility Vehicle
35	1962	Newbury Park 2500 W. Hillcrest Drive	1 Captain 1 Engineer 1 Firefighter	1 Engine Company 1 Reserve Engine
36	1985	Oak Park (Agoura) 855 N. Deerhill Road	1 Captain 1 Engineer 1 Firefighter	1 Engine Company 1 Reserve Engine

Source: Ventura County Fire Protection District, 1995

minimum fire flow required is determined by the type of building construction, proximity to other structures, fire walls, and fire protection devices as specified by the 1994 Uniform Fire Code, Appendix and adopted Amendments. New residences, for example, are generally required to have fire flows of 1,000 gallons per minute. Exceptions are older in-fill industrial and commercial uses which are typically required to have higher fire flows. Applicants for new development projects in the City must verify that the water purveyor can provide the required volume at the project.

Prior to construction of new developments, applicants must submit plans to the Ventura County Fire Department for the approval of the location of fire hydrants. The Fire Department should be contacted in advance of submitting these plans to evaluate hydrant locations and required fire flow for the specific development. If a proposed structure is greater than 5,000 square feet in area, the structure must be fitted with an automatic fire sprinkler system in accordance with Ventura County Ordinance No. 22, Appendix VII.

To help ensure adequate fire flow, the City maintains reservoir storage for fire flow, has redundant reservoirs where possible, and has developed looping systems.

3.1.4 Minimum Road Widths and Clearances Around Structures

Per City of Thousand Oaks municipal code requirements (9-3.1015 and 9-3.1016) roads shall be installed or improved to the standards specified in the City of Thousand Oaks Road Standards and construction specifications in effect at the time of construction (Ord. 744-NS, eff. April 17, 1980). The improvement shall not begin until the City Engineer has approved the improvement plans or the proposed construction.

The Ventura County Fire District, Fire Prevention Division has established Standard Planning Conditions pertaining to road widths and clearances for development projects -- including parcel maps, tracts (single and duplex dwelling units), apartments and condominiums, and commercial and industrial projects. Standard Planning Conditions include those pertaining to street widths; length, width, and percent grade of private access roads; number and type of turnaround areas and means of ingress and egress; minimum vertical clearances; and percent grade. A few of the general outlines are as follows:

- *Street widths are determined by the size of the development and type of access for the Fire Department. Road widths will vary from twelve feet to thirty-six feet depending on road lengths and off-street parking.*

- *Access roads shall be installed with an all-weather surface, suitable for access by fire department apparatus.*

- *Private driveways, serving up to two structures with exterior walls greater than 150 feet from the public roadway shall be constructed 12 feet wide and able to support a 20-ton fire-fighting vehicle. A width of 15 to 20 feet shall be provided on driveways serving 3 to 4 structures.*

- *Two means of ingress/egress shall be provided to the development in accordance with Fire District Private Road Guidelines.*

Section 9-4.3106 of the Thousand Oaks Municipal Code specifies minimum road widths in the HPD (Hillside Planned Development) zone which requires less width than any other residential zone. In the HPD zone, each new street shall have a right-of-way, roadway, and median widths conforming to the specified standards.

3.2 WILDFIRES

3.2.1 Causes and Origins of Brush Fires

Brush fire problems can be traced to three factors: vegetation, climate, and people (Leighton and Associates, 1974). The major types of vegetation found in the Thousand Oaks area (coastal sage scrub and chaparral, etc.) provide a natural source of fire fuel. These vegetative associations contain many species of plants considered pyrophytic, plants which need the heat of the fire to germinate their seeds for reproduction. When these vegetation systems are burned over by a brush fire, the existing ground cover is destroyed, but in many cases the plant association survives and is actually improved by this means of natural selection.

The climate of the region is one of the critical factors influencing the occurrence and severity of our brush fires. The hot dry summers leave the area hillsides susceptible to a major fire. During the early fall, periods of "Santa Ana" winds occur, caused by a local weather phenomenon of a low pressure system developing off the coast while a high pressure system settles over the inland desert areas. The result is the hot dry winds which pour over the mountain areas into the Conejo Valley and other southern California subregions, aggravating the potential fire threat in the high brush areas, already dried out by the summer heat. Nearly 90 percent of the large southern California fires documented over the last 73 years have occurred between September and December -- during the Santa Ana season (Crosby, 1992).

Probably the most common of the three sources is people (Leighton and Associates, 1974). Continued urbanization of the flat lands within the valleys has put increasing pressure on the development of hazardous brush covered hillsides. With the advent of man and his structures into the critical brush areas, fire prevention techniques control the natural burning processes. The longer a brush area goes without burning, the older dry, dead materials and the new plant growth constitute potentially a more volatile fuel source. These fuel sources are usually then ignited by man, either directly through arson or careless action, or indirectly through accidents such as sparks from engine exhaust, falling power lines, etc.. Natural causes are now relatively minor causes of brush fires. Man is the primary agent in this natural cycle of fire.

3.2.2 Historic Brush Fires

Table 3-3 provides a summary of brush fires which have occurred in or immediately adjacent to the City of Thousand Oaks area since 1952. The Parker Ranch fire of 1967 burned from Chatsworth to Thousand Oaks and consumed over 25,000 acres in Ventura County alone. This fire destroyed 48 structures with a value of $323,790. The Greenmeadow fire of 1993 consumed over 38,000 acres.

3.2.3 Effects of Brush Fires (Hazard Analysis)

The principal effects of brush fires include loss of vegetative ground cover, increased erosion, loss

Table 3-3 Historic Brush Fires Near Thousand Oaks (1952-1993)

Name	Origin (Quadrangle)	Date Started	Acres Burned
Ventu Park	Newbury Park	11/7/55	13,840
Sherwood	Thousand Oaks	12/28/56	26,170
Conejo Grade	Newbury Park	6/18/57	1,000
Santa Rosa	Newbury Park	12/29/58	910
Parker	Calabasas	10/15/67	25,000
Conejo Grade	Newbury Park	9/22/68	873
Clampett	LA County	9/25/70	107,163 (25,000 V. Cnty)
Camarillo Grove	Newbury Park	9/18/71	440
Santa Rosa	Newbury Park	9/26/73	437
Potrero	Camarillo	9/26/73	12,800
Conejo	Newbury Park	11/11/75	200
Potrero	Camarillo	12/28/75	2,773
Guadalasca	Newbury Park	1/17/76	84
Los Robles	Thousand Oaks	6/22/76	2,000
Potrero Road	Newbury Park	6/23/76	80
Decker	Thousand Oaks	7/4/76	146
Arroyo	Newbury Park	12/16/76	200
Conejo Grade	Newbury Park	11/30/79	100
Hill Canyon	Newbury Park	10/28/80	8,700
Hall	Santa Susana	10/8/82	2,627
Dayton	Calabasas	10/9/82	54,000 (V. Cnty 15,032)
Sherwood	Thousand Oaks	6/30/85	3,830
Sycamore	Newbury Park	4/10/88	367
Sapra	Thousand Oaks	7/5/90	119
Westlake	Thousand Oaks	10/30/91	170
Academy	Newbury Park	7/20/92	35
Greenmeadow	Newbury Park	10/26/93	38,152

Source: Ventura County Fire Department

of man-made improvements, and loss of life (Leighton and Associates, 1974).

Loss of the vegetative ground cover results in damage to valuable recreational and open space areas. Many of the plant and animal associations in the natural communities have adapted themselves to a fire-climax cycle, and will naturally generate themselves through fire. Hence, they themselves may not be permanently impacted.

Loss of vegetative cover results in secondary erosional impacts, especially in areas that are sloped. When a slope is burned over by a fire of intense heat, a chemical reaction in the soil takes place

which makes it less porous. As the rains of winter come, rain water runs off and causes mudslides and mudflows. Properties not affected directly by the fire may be damaged or destroyed by the effects of increased runoff due to brush fire.

The loss of man-made improvements in the brush covered areas constitute most of the dollar loss from fires. Losses along this line include homes, barns and sheds, utility lines and facilities. The loss of valuable watershed area combined with the actual suppression costs also are major determinants of the total dollar costs of any fire. The potential for loss of life is the most dangerous aspect of brush fires. Occasionally, trapped residents are injured or killed when there is no warning of the impending disaster, or when they simply refuse to evacuate their homes in the face of the fire. Unfortunately, the largest loss of life occurs to the professional fire fighters who are killed while fighting brush fires, which have a highly unpredictable nature, or in other accidents during the support operations necessary to suppress the fire.

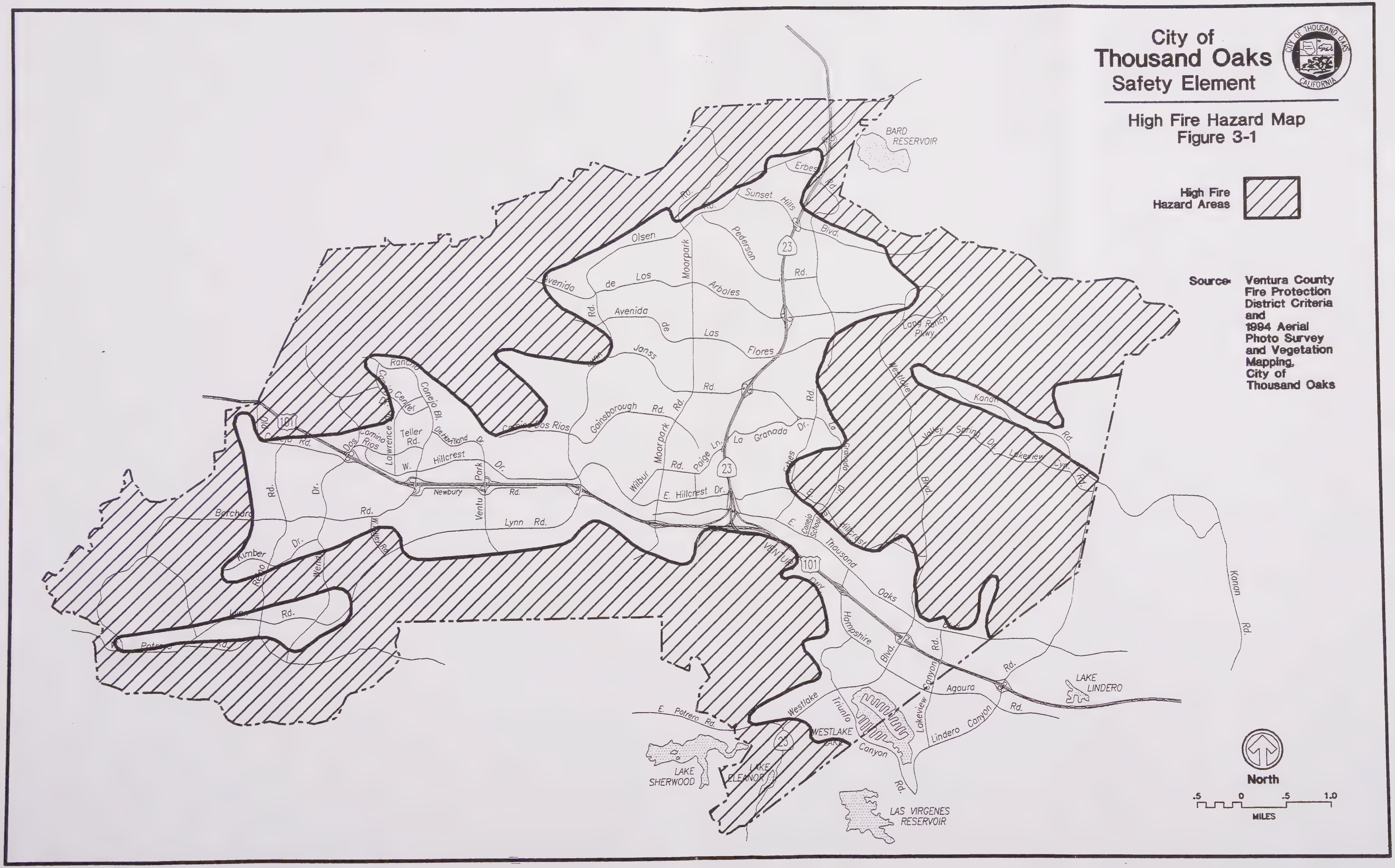
As the population of California cities continue to grow, more and more people are encroaching on what firefighters call the urban/wildland interface -- the perimeter of urban areas adjacent to wildlands. According to California Department of Forestry and Fire Protection (CDF) statistics, since 1980, more than 5,000 structures have been damaged in wildland fires -- triple the amount of damage that occurred in the previous 15 year period. Some of the more recent devastating examples of this phenomenon include:

> **Santa Barbara**: Painted Cave Fire of June 1990 which swept across almost 5,000 acres of coastal hillsides, destroying more than 600 houses.
>
> **Oakland/Berkeley**: 1991 Fire covering over 1,600 acres, decimated entire neighborhoods, killing 25 people, destroying 2,900 homes, and leaving more than $1.5 billion in property damage.
>
> **Malibu to Laguna Beach**: A series of fires in the fall of 1993 which killed three people and destroyed over 1,000 homes.

A number of residential areas in Thousand Oaks which are located at the perimeter adjacent to large expanses of open space have been threatened by wildland fires in the past, including:

- *the Ventu Park area adjacent to steep hillside areas covered with heavy chaparral brush,*
- *residential areas adjacent to densely-vegetated steep canyons of the Arroyo Conejo system,*
- *other developments located adjacent to large expanses of brush and grassland.*
  (City of Thousand Oaks, Emergency Operations Plan).

Figure 3-1 presents potential wildfire hazard areas. The mapped area is based on State Division of Forestry criteria as presented in the Ventura County General Plan, Hazards Index. The level of



Rincon Consultants

hazard is based largely on the type of ground cover and slope.

3.2.4 Fire Hazard Reduction

Experienced firefighters believe they can no longer protect homes and lives as well as they did in the past with fuel loading causing such catastrophic fires (Gilmer, undated). It is up to the homeowners living on the urban/wildland interface to establish defensible space. Defensible space describes a band of managed vegetation around a home which stops the movement of fire by denying fuel. The Fire Department does not recommend indiscriminate clearing of native chaparral and other vegetation. Natural vegetation plays an important role in erosion control. The goal is to obtain a balance between fire hazard reduction and erosion control. Defensible space also provides a place where fire fighters can do their jobs without unnecessary risk to themselves. According to the CDF, as many as 80 percent of the homes lost to wildfires in the past could have been saved if the owners had followed a few simple fire safe practices. Some of these fire safe practices include the following:

- *Use fire resistant landscaping. Fire resistant plants are those with low growth habit (generally less than 18 inches in height), low fuel volume, and high moisture content. Such plants offer far less fuel than upright woody shrubs.*

- *Irrigate and maintain landscaping. A fire resistant plant will lose this quality if allowed to dry out. Maintenance insures the effectiveness of the fire resistant landscape by retaining proper spacing between plants and removing dead/dry vegetation.*

- *Have a fire-retardant roof. Untreated wood shake roofs provide fuel for an advancing fire. Class A roofs provide the most protection. These include: clay tile, concrete tile, fibrous cement shake, metal tile, and fiberglass composition shingles.*

In response to the disastrous Oakland Hills Fire of 1991, the Bates Bill (AB 337) was passed in 1992. The Bates Bill is a State measure that requires local agencies to designate by ordinance their Very High Fire Hazard Severity Zone to require brush clearance in the zone and for all new construction to be provided a Class B or better roof.

The Ventura County Fire Protection District has developed a Fire Hazard Reduction Program with the goal of preventing the loss of life and property due to uncontrolled wildfire in the urban/wildland interface through the cooperation of the property owners of Ventura County (Ventura County Fire Protection District, undated). The stated objectives of the Fire Hazard Reduction Program are to:

1. *Reduce significantly the incidence of destructive fires in the urban/wildland interface areas, and the resulting loss of life and property.*

2. *Provide a defensive perimeter around urbanized areas of the Fire District.*

3. *Provide for the protection of structures in the urban/wildland interface by establishing and maintaining a 100-foot defensible perimeter around each structure.*

4. *Provide for the removal of annual fuels within the defensive perimeter.*

5. *Provide any fire suppression resource from any agency the opportunity to successfully protect structures and other valuable properties during a wildfire threat.*

6. *Protect the watershed fire areas from exposure to structure fires in the urban/wildland interface areas.*

The Fire Hazard Reduction Program strives to establish defensive barriers in the urban/wildland interface in preparation for the annual onslaught of wildfire. Hazardous vegetation is at its peak growth in the spring and fall seasons. An inspection program has been developed that targets hazard reduction in the spring and fall months. Within the 100-foot defensible perimeter, all brush, flammable vegetation, or combustible growth identified as a fire hazard by an inspecting officer is required to be mowed or cut to a stubble height not to exceed 3 inches. All cuttings are required to be removed from the property. Single specimens of trees, ornamental shrubbery or ground covers are permissible provided that they do not form a means of rapidly transmitting fire from the native growth to any structure. Other specific clearance requirements pertain to roof surfaces, chimneys, propane tanks, access roads, and vacant parcels and are specified within the Fire Hazard Reduction Program guidelines (Ventura County Fire Protection District, undated).

If the Fire Department conducts an inspection of a property and determines fire hazard reduction is necessary, a "Notice to Abate Fire Hazard" is generated and mailed to the property owner. If the property owner fails to comply with the notice, the Fire Department retains a contractor to remove the hazardous vegetation from the property and places a tax lien assessment for the costs involved on the property owner's tax bill.

The best defense against disastrous fires affecting the urban/wildland interface is a working partnership between property owners, their neighbors, and the Ventura County Fire Department. More detailed information pertaining to defensible space strategies and other fire hazard reduction approaches can be obtained from the Ventura County Fire Protection District.

The Ventura County Fire Protection District has developed a five year vegetation management plan with the goal of identifying and treating high fire hazard and risk areas that are found to constitute a threat to high value property. Treatment to remove and manage the hazardous accumulations of wildland vegetation is accomplished using prescribed burning. Burning projects identified in the plan consider and protect the values of air quality, historical artifacts, endangered plants and species. The plan is reviewed and updated every three years.

The purpose of prescribed burning is:

- *To provide a defense against wild fire destroying private property where the Fire Hazard Reduction Program cannot stand alone.*
- *To enhance rangeland productivity.*
- *To increase useful water yield.*
- *To protect and/or improve the wildland's carrying capacity and habitat diversity for wildfire.*

Prescribed burning is the application of fire to wildland fuels when conditions such as weather, fuels and topography permit the specific objective to be accomplished safely. Prescribed burning is the most economical and environmentally sound approach to managing large blocks of fuel.

4.0 DISASTER PREPAREDNESS AND EMERGENCY EVACUATION

4.1 EMERGENCY OPERATIONS PLAN

The City of Thousand Oaks has prepared a draft Emergency Operations Plan (EOP) that provides emergency guidelines for responding to natural disasters and technological incidents. The Plan focuses on potential large scale disasters which can generate unique situations requiring unusual responses, often requiring mutual aid from various agencies. It provides operational protocols to be used in various emergency situations, describes the Local Emergency Management Organization, and outlines specific agency responsibilities in the overall protection of life and property. The Plan also outlines mutual aid agreements (County, State, and Federal) and specific statutory authorities.

Emergency preparedness is a significant component of the plan and includes emergency planning, training of City personnel to respond to disasters, public awareness and education programs, and commitment of resources to cope with emergencies. Hazard mitigation is also an important component of the plan - which includes mitigation measures to reduce losses from disasters, including the development and enforcement of appropriate land use, design and construction regulations.

The Emergency Operation Center (EOC) is the City location where a disaster is managed. The City of Thousand Oaks EOC is located at the East Valley Law Enforcement Facility, 2101 East Olsen Road. If the EOC is damaged or inaccessible in an emergency, the alternate EOC is the City Hall located at 2100 Thousand Oaks Boulevard.

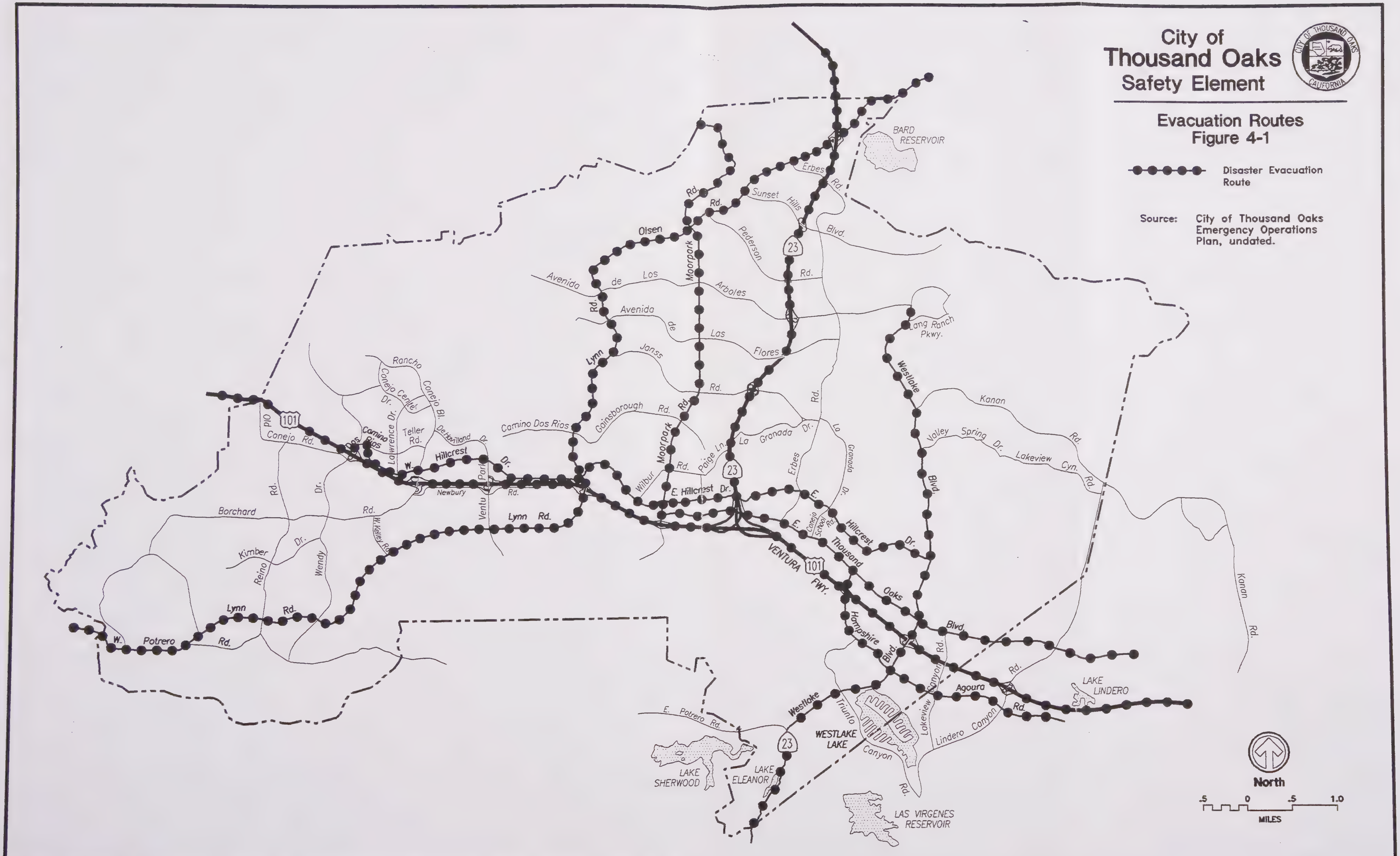
4.1.1 Evacuation Routes

The Ventura County Sheriff's Department is ultimately responsible for coordinating evacuation necessitated by an emergency. If delayed during a large disaster, the Public Works Director for the City is responsible for coordinating evacuation efforts on an interim basis.

Annex H of the EOP provides a listing of freeways and streets to be used in the event of a disaster requiring evacuation. Detailed maps for evacuation routes are kept at the Municipal Service Center located in Newbury Park. Major evacuation routes are shown on Figure 4-1 of this document.

4.1.2 Evacuation Centers

Annex G of the EOP describes the organizational and operational procedures to be used during a major natural disaster or incident in order to meet the food, shelter and clothing needs of large numbers of people. The American Red Cross is the lead agency involved in providing disaster


City of
Thousand Oaks
Safety Element
Evacuation Routes
Figure 4-1
Disaster Evacuation Route
Source: City of Thousand Oaks Emergency Operations Plan, undated.
North
MILES
BARD RESERVOIR
LAKE SHERWOOD
LAKE ELEANOR
WESTLAKE LAKE
LAS VIRGENES RESERVOIR
LAKE LINDERO
VENTURA FWY.

relief during peacetime disasters. Authority is mandated by Federal Law 36-USC-3 and reaffirmed in Public Law 930288 (Federal Disaster Relief Act of 1974). The Red Cross acts cooperatively with State and local governments, including the California Office of Emergency Services and the California Department of Social Services, and private relief organizations to provide relief services.

Evacuation centers to be used in the event of disaster vary depending on the location and nature of the disaster. The facilities most likely to be used are the local high schools (Newbury Park, Thousand Oaks, and Westlake High Schools; personal communication with Rick Rink of the American Red Cross). These facilities are ideal because they are public facilities and can accommodate lodging, feeding and showering. Other options include junior and elementary schools, churches, and even commercial lodging facilities.

4.2 HAZARDOUS MATERIALS SPILLS

Introduction. More than 60,000 chemicals are produced in the United States. Over 11,000 of these chemicals are used for commercial purposes. Within the County of Ventura, over 5,000 manufacturing and service industries use or store hazardous materials, including pesticides, acids, caustics, solvents, and heavy metals (Ventura County, 1989). Because of the widespread use of hazardous materials in our communities, minor and major hazardous materials spills and incidents occur. Most of these incidents are related to the increasing transport of chemicals over roadways or through industrial accidents. U.S. Highway 101 and State Route 23 are major transportation corridors through the Conejo Valley. The California Highway Patrol estimates that about 105 trucks carrying hazardous materials or waste travel northbound through Thousand Oaks on a given day (number based on data obtained from inspection station at the top of the Conejo Grade) . Accounting for southbound traffic and traffic on S.R. 23, the total number of trucks passing through the City is likely 200 or more.

In an effort to reduce impacts associated with a hazardous material Incident, Ventura County has developed a Hazardous Materials Emergency Response Plan. The goal of the plan is to protect life, property, and the environment from the effects of a hazardous material release to air, land or water or a hazardous material fire. Procedures to be used in the event of an incident and specific agency responsibilities are identified within the plan. The Plan is activated by the designated Incident Commander at the scene. Depending on the nature of the incident, this could be either the appropriate law enforcement authority (Ventura County Sheriff's Department or California Highway Patrol) or the Ventura County Fire Department.

The County Hazardous Materials Emergency Response Plan is supplemented by individual Business Plans for businesses/facilities that store or handle hazardous materials and wastes. Under Chapter 6.95, Section 25503 of the California Health and Safety Code, Business Plans are

required from California business that handle a hazardous material in quantities equal to or greater than the following:

- *55 gallons of a liquid,*
- *500 pounds of a solid,*
- *200 cubic feet of a compressed gas, or*
- *extremely hazardous substances above Federal threshold reporting quantities*

As part of the Business Plan, emergency response plans and procedures must be developed and training sessions must be provided to employees. Businesses are periodically inspected by local administering agencies (Ventura County Environmental Health Services Division) to ensure that handling, storage, and waste disposal practices conform with appropriate laws and regulations.

According to the EOP, there are approximately 255 businesses in the City of Thousand Oaks using and/or storing materials which are classified as hazardous. These businesses include gasoline stations, automotive repair facilities, dry cleaners, and miscellaneous commercial and industrial facilities. Industrial use of hazardous materials is centered in the Newbury Park industrial area (Rancho Conejo Industrial Park) north of Highway 101. Many of the commercial businesses that store or use hazardous materials are located on Thousand Oaks Boulevard or Moorpark Road. Specific information regarding the location of businesses and types and quantities of hazardous substances used or stored can be obtained through the County of Ventura Fire Protection District.

Table 4-1 provides a listing of facilities that use or store extremely hazardous materials. Extremely hazardous wastes (or materials) are defined by California HWCL as any hazardous waste or mixture of hazardous wastes which, if human exposure should occur, may likely result in death, disabling personal injury or serious injury because of its quantity, concentration, or chemical characteristics. Table 4-1 lists the hazardous material used or stored at the respective site, and the maximum volume. As shown in this table, sulfuric acid is the hazardous material used at many of the sites (GTE and Pacific Bell). The sulfuric acid is contained within backup batteries at these sites. The general hazard ranking for these sites is generally thought to be low (personal communication with Mr. Steve Gephardt of Ventura County Environmental Health District). Specific uses for the hazardous materials at the other sites is unknown.

Hazard Analysis. The seriousness of a hazardous material incident is dependent on a number of factors including the type and quantity of material involved, the proximity to populated areas, the time of day, weather conditions and physical state of material (i.e., solid, liquid, vapor or gas). The greater the number of people exposed to the hazardous material, the greater the potential for significant impact. Because of their dispersion characteristics, vapors and gases tend to involve greater hazards. Under a worst case scenario, an incident could result in fatalities and injuries, destruction of private and public improvements, and contamination of the environment.

Table 4-1 Sites that Use/Store Extremely Hazardous Materials

Facility Name	Address	Hazardous Material	Maximum Volume (lbs)
GTE California	670 Lawrence Dr.	Sulfuric Acid	124
GTE California	1854 Camino Dos Rios	Sulfuric Acid	124
GTE California	1204 Thousand Oaks Blvd.	Sulfuric Acid	124
GTE California	2949 Moorpark Road	Sulfuric Acid	124
GTE California	50 S. Parker	Sulfuric Acid	124
GTE California	112 Lakeview Canyon	Sulfuric Acid	124
Pacific Bell	400 Minor Street	Sulfuric Acid	124
Rockwell-Microelec.	2427 Hillcrest Drive	Ammonia	800
Semtech	652 Mitchell Road	Nitric Acid Sulfuric Acid	10 10
Shamban	711 Mitchell Road	Ammonia	1548
Amgen	1840 DeHavilland Drive	Sulfuric Acid	842

Source: Ventura County Environmental Health District; February, 1995

Although a hazardous materials release could occur anywhere within the City of Thousand Oaks, certain areas are at greater risk. These include the following:

- *U.S. Highway 101 and State Route 23 are major transportation corridors through the Conejo Valley. A hazardous material spill involving transportation would most likely occur along one of these highways.*

- *Because of the high number of businesses that use or store hazardous materials on Thousand Oaks Boulevard or Moorpark Road, these major arterials and adjacent neighborhoods are potentially at greater risk than other areas of the City.*

- *Because of the concentration of industrial businesses north of Highway 101 in Rancho Conejo Industrial Park, this area is also potentially at greater risk than other parts of the City.*

In addition to traffic related incidents, hazardous materials spills could be caused by ground shaking associated with a large earthquake or other soil related hazards (landslide, debris flow, liquefaction, etc.). As discussed in Section 1.3.1, peak horizontal ground accelerations of 0.6 g and Modified Mercalli Intensities of X could cause major structural damage to facilities using hazardous materials. Hazardous material containers not properly secured could be felled and/or ruptured. Improperly segregated materials could result in toxic or explosive reactions.

5.0 CRITICAL AND LIFELINE FACILITIES

5.1 CRITICAL FACILITIES

Introduction. Critical facilities are generally defined as those structures whose ongoing performance during an emergency is required or whose failure could threaten many lives. Type of structures vary but may include hospitals, urgent care, and private ambulance companies; fire stations; police and emergency services facilities; schools; utility and communication facilities.

A map of select critical facilities in the Thousand Oaks area is included as Figure 5-1. A key to these facilities is provided in Table 5-1.

Hazard Analysis. Based on information provided in previous sections of this report, there are a number of potential hazards that could affect existing critical structures in the City of Thousand Oaks. These include flood and dam inundation, seismic and geohazards and fire hazards. The following provides a summary of existing critical facilities located in potentially hazardous areas. No specific reference is made to geologic hazards because all of the facilities may be affected by such hazards - especially groundshaking caused a large regional earthquake. Measures that can be taken to reduce these hazards are addressed in previous sections of this document.

Hospitals and Emergency Care Facilities. The Thousand Oaks Planning Area is served by one hospital, Los Robles Regional Medical Center, a 208 bed facility. The City is also served by three urgent care facilities: Newbury Park Urgent Care, Thousand Oaks Urgent Care, and West Oaks Urgent Care. None of these facilities are located in areas subject to specific hazards other than groundshaking due to earthquake.

New hospitals are required to undergo stringent design and construction standards in conformance with the Hospital Act of 1972. This legislation was enacted following the 1971 San Fernando Earthquake of Southern California in which several hospitals in the vicinity of the epicenter were seriously damaged and unable to continue functioning during a critical period. These newer standards are considerably more stringent than standards in place prior to 1972.

Schools. Existing schools are potentially susceptible to a number of hazards including:

- *Newbury Park High School and Manzanita Elementary School are located within or adjacent the 100-year flood zone.*
- *Westlake Elementary School is located within the dam inundation hazard area that would be caused by a failure of Lake Sherwood Dam.*

Table 5-1: Critical Facilities in the City of Thousand Oaks

Fire Stations

1. Fire Station No. 32
2. Fire Station No. 35
3. Fire Station No. 30
4. Fire Station No. 33
5. Fire Station No. 34
6. Fire Station No. 31
7. Fire Station No. 36

Law Enforcement

8. East Valley Law Enforcement Facility

Hospital/Emergency Medical

9. Los Robles Hospital/Medical Center
10. Newbury Park Urgent Care
11. Thousand Oaks Urgent Care
12. West Oaks Urgent Care
13. Careline Health Services (west)
14. Careline Health Services (east)

City Facilities

15. Municipal Service Center
16. Public Library-Newbury Park Branch
17. Hill Cyn Wastewater Treatment Plant
18. Thousand Oaks Teen Center
19. Goebel Senior Adult Center
20. Public Library-Main Branch
21. Civic Arts Plaza-City Hall
22. Olsen Road Water Reclamation Facility

Schools

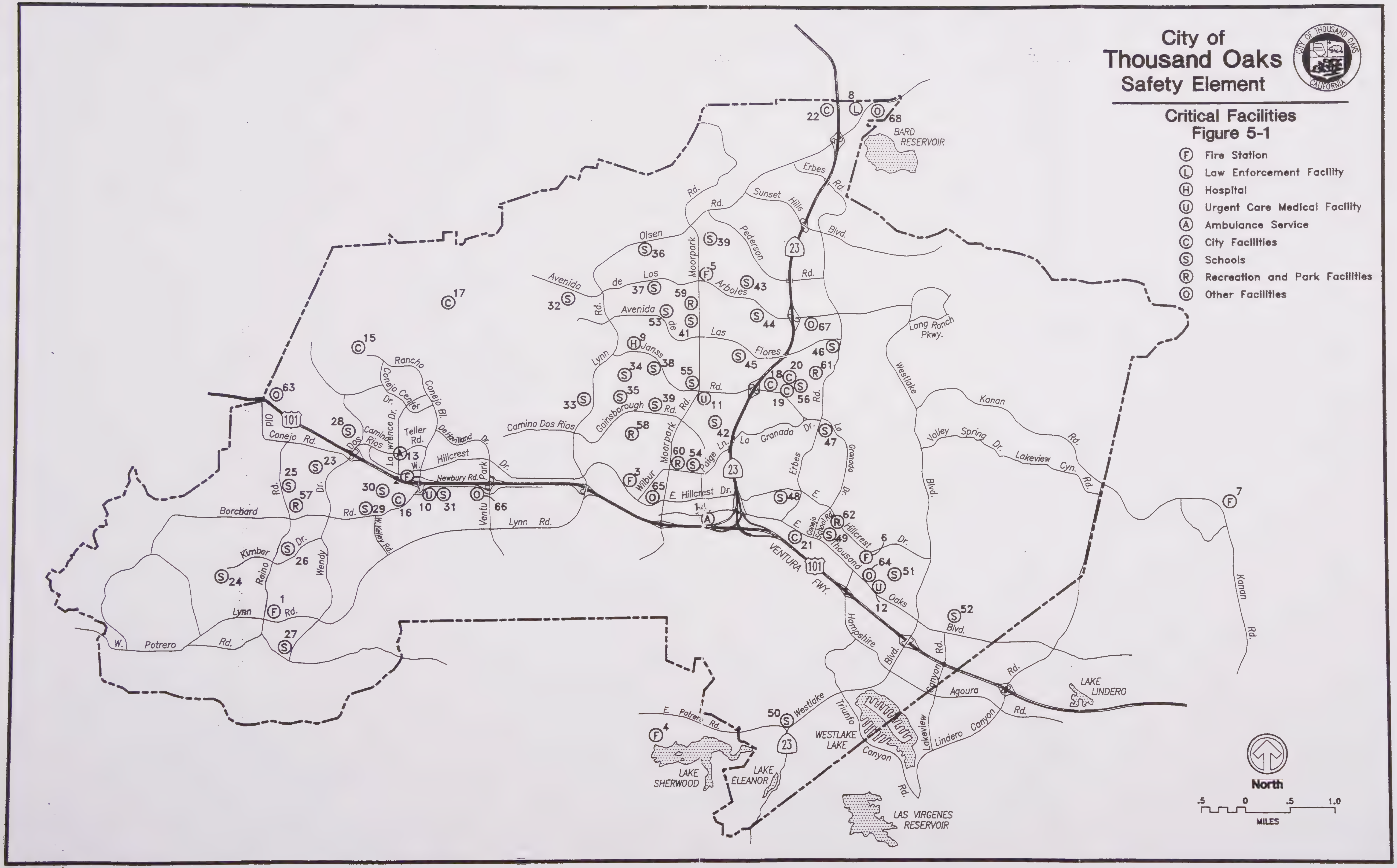
23. Walnut Elementary School
24. Cypress Elementary School
25. Newbury Park High School
26. Maple Elementary School
27. Banyan Elementary School
28. Newbury Park Adventist Academy
29. Sequoia Intermediate School
30. Manzanita Elementary School
31. Conejo Valley High School
32. Wildwood Elementary School
33. Glenwood Elementary School
34. Aspen Elementary School
35. Redwood Intermediate School
36. California Lutheran University
37. University Elementary School
38. La Reina High School
39. Acacia Elementary School
40. Weathersfield Elementary School
41. Thousand Oaks High School
42. Glenwood Elementary School
43. Ladera Elementary School
44. Park Oaks Elementary School
45. Waverly Park Adult Education
46. Los Cerritos Intermediate School
47. Meadows Elementary School
48. Colina Intermediate School
49. Conejo Elementary School
50. Westlake Elementary School
51. Westlake Hills Elementary School
52. Westlake High School
53. Horizon Hills School
54. Pinecrest School
55. St. Paschal Baylon School
56. St. Patrick's School

Conejo Recreation and Park District Facilities

57. Borchard Community Center & Corporate Yard
58. Conejo Community Center
59. Thousand Oaks Community Center
60. Administrative Offices
61. Old Meadows Community Center
62. Conejo Service Yard

Other

63. Truck Inspection Station
64. Main Post Office
65. Branch Post Office
66. Branch Post Office
67. Department of Motor Vehicles
68. Calleguas Municipal Pumping, Filtration, and Treatment Plant



Rincon Consultants

- *Cypress Elementary School, Banyan Elementary School, Conejo Elementary School, Westlake Elementary School, and Westlake High School are located within or immediately adjacent to areas of high fire hazard.*

The State of California has the responsibility for ensuring that public school buildings are adequately constructed to meet seismic design standards established in the Garrison Act of 1969.

Fire Stations and Law Enforcement Facility. Thousand Oaks has five fire stations and one law enforcement facility. The location of these facilities is shown on Figure 5-1. Some of these facilities are potentially susceptible to various hazards including:

- *As discussed in Section 3.1 of this document, Fire Stations 33, 34, and 35 were constructed prior to 1971 and could require seismic retrofitting to be in compliance with current guidelines.*
- *Fire Station No. 32 is located adjacent the 100-year flood zone.*
- *The East Valley Law Enforcement Facility is located within a high fire hazard area.*

Other Facilities. Various other critical facilities are potentially susceptible to hazards including the following:

- *The Newbury Park branch public library and the Borchard Community Center and Corporate Yard are located within or adjacent the 100-year flood zone.*
- *The Municipal Service Center, Hill Canyon Wastewater Treatment Plant, Olsen Road Water Reclamation Facility, and Calleguas Municipal Pumping, Filtration, and Treatment Plant are located within a high fire hazard area.*

5.2 LIFELINE FACILITIES

Introduction. Lifeline facilities are utility corridors and associated facilities that may be damaged by catastrophic events such as earthquakes. These include: major gas lines, major power lines, crude oil pipelines, major water lines and water tanks. Figure 5-2 shows lifeline facilities in the Thousand Oaks area.

Hazard Analysis.

Electrical. The City of Thousand Oaks is supplied electrical power by Southern California Edison. The location of major electrical transmission lines and transmission substations (Newbury Sub, Thousand Oaks Sub, and Potrero Sub) is shown in Figure 5-2.

Substations are the most vulnerable component of the electrical power delivery system.

Transformers, switches, circuit breakers, control equipment, and high-voltage porcelain insulators are especially susceptible to high-frequency ground motions which can be generated in earthquakes. A substation can be disabled by seismic intensities as low as VII (Toppozoda et al., 1988). Newbury substation is located in an area of extremely high fire hazard.
Buried electrical transmission lines may be susceptible to liquefaction in the event of a ground failure triggered by an earthquake. Many of the transmission lines (including those running along Reino Road, Moorpark Road, and Thousand Oaks Boulevard) are located in areas of older unconsolidated alluvium and may be susceptible to liquefaction and other soil related hazards.

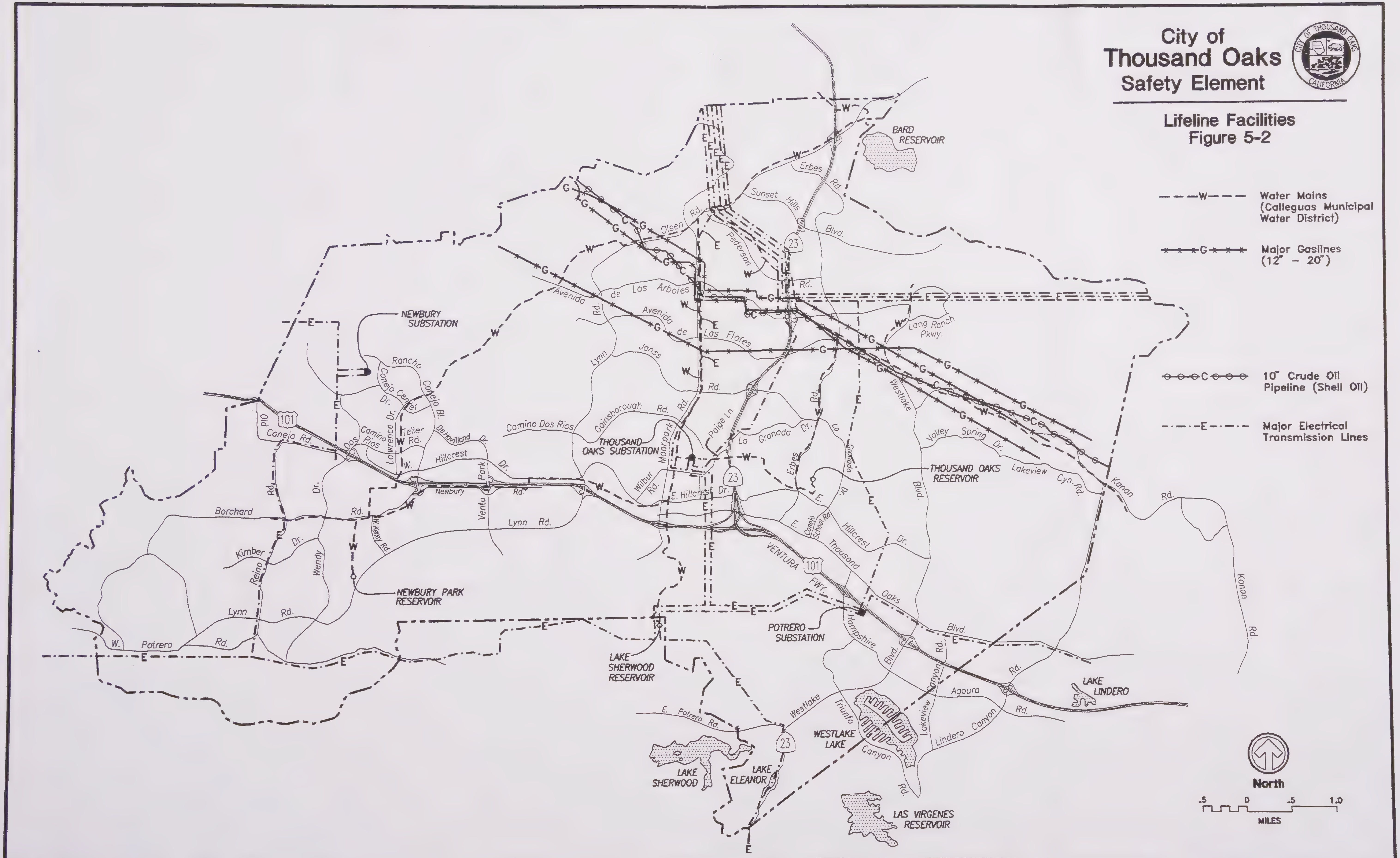
If damaged during an earthquake, sections of the City may be without power. Critical facilities such as hospitals, the East Valley Law Enforcement Facility Emergency Operations Center and Fire Stations can function on backup generators. If only limited electrical service can be restored following a disaster, these facilities should be given priority.

Lack of electrical power can also impair designated evacuation centers, communication facilities, and water distribution systems. Evacuation centers that will most likely be used during a disaster and emergency communication facilities should be equipped with backup power systems. Gravity-fed water distribution systems should be incorporated into City-wide, fire suppression emergency programs.

Natural Gas and Oil. Natural gas is supplied to the City by Southern California Gas Company. The location of major distribution lines (12" to 20") are shown in Figure 5-2. Distribution lines between Olsen Road and Westlake Boulevard and along Lynn Road traverse areas of older alluvium and may be susceptible to liquefaction and other soil related hazards. Damage to these lines during an earthquake could result in an interruption of service or, in a worst case scenario, fires or explosions. Leaks would be expected to occur mostly at piping connections and valves. Another area of concern is the Erbes Road Landslide (along Westlake Boulevard). Three main gas lines pass through this feature. Movement of the landslide mass could result in rupture of a gas line which could cause fires or explosions.

A 10-inch diameter crude oil pipeline (Ventura-Wilmington Crude Line), operated by Shell Pipe Line Corporation of Anaheim California, traverses the northeastern portion of the City. Crude oil pipelines are typically buried within the upper 5 feet and are equipped with emergency shut off valves. This pipeline could potentially be damaged in an earthquake, resulting in disruption of service and contamination of surface waterways, soil, and underlying ground water. The pipeline passes through the Erbes Road Landslide and areas of older unconsolidated alluvium (between Olsen Road and Westlake Boulevard) and, thus, may be susceptible to landsliding, liquefaction and other soil related hazards.

Water. Water is supplied to water purveyors within the City of Thousand Oaks by the Calleguas Municipal Water District (CMWD). The location of CMWD distribution lines are shown in Figure 5-2. CMWD purchases approximately 100,000 acre-feet of water per year from the Metropolitan Water District of Southern California (MWD). Bard Reservoir, located north of the City and owned by CMWD, stores about 10,000 acre-feet of water. Area reservoirs include


City of
Thousand Oaks
Safety Element
CITY OF THOUSAND OAKS CALIFORNIA
Lifeline Facilities
Figure 5-2
Water Mains (Calleguas Municipal Water District)
Major Gaslines (12" - 20")
10" Crude Oil Pipeline (Shell Oil)
Major Electrical Transmission Lines
North
MILES
BARD RESERVOIR
NEWBURY SUBSTATION
THOUSAND OAKS SUBSTATION
THOUSAND OAKS RESERVOIR
NEWBURY PARK RESERVOIR
POTRERO SUBSTATION
LAKE SHERWOOD RESERVOIR
LAKE SHERWOOD
LAKE ELEANOR
WESTLAKE LAKE
LAS VIRGENES RESERVOIR
LAKE LINDERO
VENTURA FWY.
Olsen Rd.
Sunset Hills Blvd.
Erbes Rd.
Pederson Rd.
Avenida de Los Arboles
Avenida de Las Flores
Lynn Rd.
Janss Rd.
Gainsborough Rd.
Camino Dos Rios
Moorpark Rd.
Wilbur Rd.
E. Hillcrest Dr.
Paige Ln.
La Granada Dr.
Lang Ranch Pkwy.
Westlake Blvd.
Valley Spring Dr.
Lakeview Cyn. Rd.
Kanan Rd.
Rancho Conejo Bl.
Conejo Center Dr.
Lawrence Dr.
Teller Rd.
DeHavilland Dr.
Hillcrest Dr.
Newbury Rd.
Ventu Park Rd.
Conejo Rd.
Borchard Rd.
Kimber Dr.
Reino Rd.
Wendy Dr.
W. Potrero Rd.
E. Potrero Rd.
Thousand Oaks Blvd.
Conejo School Rd.
Hampshire Rd.
Agoura Rd.
Triunfo Canyon Rd.
Lindero Canyon Rd.
Lakeview Canyon Rd.
Westlake Blvd.

Newbury Park Reservoir, Lake Sherwood Reservoir, and Thousand Oaks Reservoir. Three main water retailers supply CMWD water to City residents. These include: 1) California-American Water Company, 2) California Water Service Company, and 3) City of Thousand Oaks. The location of the water retailer lines are not shown on Figure 5-2.

Water distribution lines could be damaged in an earthquake as a result of liquefaction. Breaks in water distribution pipelines could result in disruption of service, loss of pressure, and localized flooding and associated impacts (erosion, sinkholes, etc.). A lack of adequate water pressure could result in inadequate flow for fire suppression. Additional information pertaining to fire suppression is provided in Section 3.1.1 of this document. Areas of the City potentially susceptible to liquefaction and other soil related hazards include lines along Borchard Road, Lawrence Drive, U.S. Highway 101, Olsen Road, Moorpark Road, Paige Lane, and Erbes Road.

Water lines along Borchard Road and Highway 101, and lines crossing under Moorpark Road, Paige Lane, and the Thousand Oaks North Drain could be damaged by a 100-year flood event.

6.0 GLOSSARY

Acceleration The time rate of change of velocity of a reference point during an earthquake. Commonly expressed in percentage of gravity.

Active Fault As defined by the State Mining and Geology Board, a fault which has had surface displacement within Holocene time (about the last 11,000 years).

Alluvium Loosely compacted gravel, sand, silt, or clay deposited by streams.

Amplified-Shaking Hazard Zone An area where historic occurrence of amplified ground shaking, or local geological and geotechnical conditions indicate a potential for ground shaking to be amplified to a level such that mitigation as defined in California Public Resources Code Section 2693© would be required. AS-Zones are characterized by soft sediments overlying hard rock and include the soil conditions described in UBC Soil Types S3 and S4.

Aquifer A water-bearing body of porous and permeable rock or sediment.

Attenuation A decrease in seismic signal amplitude as waves propagate from the seismic source.

Base Flood A flood that statistically could occur once in 100 years on average, although it could occur in any year. For flood insurance purposes, 100-year flood and base flood have the same meaning.

Bedrock Relatively hard, solid rock that commonly underlies softer rock, sediment, or soil.

Certified Engineering Geologist An individual who is licensed by the State of California to practice engineering geology.

Cohesionless Refers to a sediment whose shear strength depends only on friction, because there is no bonding between the grains.

Colluvium Loose soil or rock fragments on or at the base of gentle slopes or hillsides. Deposited by or moving under the influence of rainwash or downhill creep.

Combustible Material Under VCFPD Ordinance No. 20, seasonal and recurrent weeds, stubble, brush, dry grass, dry leaves or tumbleweeds; or rubbish, letter or flammable material of any kind.

Conflagration A large and destructive fire, usually aggravated by strong winds which carry firebrands over natural or manmade barriers.

Conglomerate A sedimentary rock composed of rounded, pebble, or cobble to boulder-size fragments, usually in a finer matrix of sand.

Critical Structures and Facilities Structures and facilities which are subject to specified seismic safety standards because of their immediate and vital public need or because of the severe hazard presented by their structural failure. Type of structures vary but may include (1) structures such as nuclear power reactors or large dams whose failure might be catastrophic; (2) major communication, utility, and transportation systems; (3) involuntary- or high-occupancy buildings such as prisons or schools; and (4) emergency facilities such as hospitals, police and fire stations, and disaster-response centers.

Debris Flows A fast-moving slurry of mud, rocks and organic debris; commonly termed mudflow. Debris flows occur during intense storm events.

Defensible Space An area around the perimeter of structures or developed areas in the wildland which are key points of defense/attack against encroaching wildfires or escaping structure fires.

Epicenter The point on the Earth's surface vertically above the point (focus or hypocenter) in the crust where a seismic rupture initiates.

Expansive Soil A soil which undergoes a significant and reversible change in volume resulting from a change in moisture content.

Fault A fracture or zone of closely associated fractures along which rocks on one side have been displaced with respect to those on the other side. Strike-slip faults are chiefly vertical fractures along which rock masses have shifted horizontally. Dip-slip faults are chiefly inclined fractures along which rock masses have shifted vertically. If the rock mass above an inclined fault is depressed, the fault is termed normal slip, whereas the term reverse slip (or thrust) indicates that the side above the fault is elevated. Oblique-slip faults have significant components of both strike and dip slip along them.

Fault Trace Intersection of a fault with the ground surface; also, the line commonly plotted on geologic maps to represent a fault.

Fill The deposition of earth or any other substance or material by artificial means for any purpose.

Fire Hazard Any thing or act which increases or may cause an increase of the fire hazard or menace of fire to a greater degree than that customarily recognized as normal. Any thing or act which may obstruct, delay, hinder, or interfere with the operations of the Fire District or the egress of occupants in the event of fire.

Flood Insurance Rate Map Map used for insurance purposes on which the Federal Insurance Administration has delineated the special flood hazard area, base flood elevations and the risk premium zones applicable to the community.

Floodplain The relatively level land area on either side of a stream's banks that is subject to flooding. The 100-year floodplain is used for planning purposes and is designated on Flood Boundary and Floodway Maps prepared by the Federal Insurance Administration.

Formation A rock unit which can be recognized, named, and mapped, e.g., the Topanga Formation.

Geotechnical Pertaining to geologic-soils engineering studies, features, conditions or events.

Grading Excavating or filling land, or a combination thereof.

Hazardous Material Pursuant to California Hazardous Waste Control Law (HWCL), a hazardous material (or waste) is defined as a material that, due to its quantity, concentration, or physical, chemical, or infectious characteristics, may: (1) cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness; or (2) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

Holocene Time The most recent geologic epoch of time; the past 11,000 years.

Hypocenter The point within the Earth where an earthquake rupture initiates.

Incident Command System A standard system for organizing response to hazardous materials incidents.

Intensity A subjective numerical index describing the severity of an earthquake in terms of its effects on the Earth's surface and on humans and their structures. A condensed version of the Modified Mercalli intensity scale is included with this report.

Liquefaction Process by which water-saturated sediment temporarily loses strength, usually because of strong shaking during a major earthquake, and behaves as a fluid.

Magnitude A number that characterizes the size of an earthquake, based on measurement of the maximum motions recorded by a seismograph for earthquake waves of a particular frequency. The scale most commonly used is local magnitude commonly referred to as Richter magnitude.

Perched Ground Water Ground water separated from the underlying main body of ground water by an unsaturated zone.

Period The time interval required for one full cycle of a wave.

Potentially Active Fault A fault which shows evidence of surface displacement during Quaternary time (last 1.6 million years).

Recurrence Interval The average time span between events (such as large earthquakes, ground shaking exceeding a particular value, or liquefaction) at a particular site.

Registered Geologist A geologist who is licensed by the State of California to practice geology.

Registered Geotechnical Engineer A civil engineer licensed by the State of California, experienced in the practice of geotechnical engineering.

Soils Engineer A registered civil engineer licensed in the State of California, experienced in the practice of soils and foundation engineering.

Soils Investigation A report prepared by a Registered Geotechnical Engineer or a Soils Engineer, including subsurface exploration and laboratory testing.

Sandstone A sedimentary rock of cemented sand-size particles.

Saturated A rock or soil whose interstices are filled with water.

Sedimentary Rock The class of rocks made up of transported and deposited rock and mineral particles (sediment) and of chemical substances derived from weathering.

Seiche Oscillation of the surface of an enclosed body of water owing to earthquake shaking.

Seismicity The geographic and historical distribution of earthquakes.

Settlement The downward movement of a soil or of the structure which it supports, resulting from a reduction in the voids in the underlying strata.

Shale A thinly layered or stratified sedimentary rock of clay-size particles.

Siltstone A sedimentary rock of cemented particles intermediate in size between sand and clay (silt).

Slip Rate The average rate of displacement at a point along a fault as determined from geodetic measurements, from offset manmade structures, or from offset geologic features whose age can be estimated.

Soil In engineering, all unconsolidated material above bedrock.

Stratigraphy The study of the character, form, and sequence of layered rocks.

Subsidence Downward settling of the Earth's surface with little or no horizontal motion. May be caused by natural geologic processes (such as sediment compaction or tectonic activity) or by human activity (such as mining or withdrawal of ground water or petroleum).

Subsurface Geologic Report A geologic investigation conducted by a Registered Geologist or Certified Engineering Geologist that provides information on the distribution, nature, genesis and properties of subsurface materials through direct observation by means of trenches, test pits or borings.

Surface Faulting Displacement that reaches the ground surface during slip along a fault. Commonly accompanies moderate and large earthquakes having focal depths to 20 km.

Tectonic Refers to crustal-deforming processes that affect relatively large areas.

Tsunami An impulsively generated sea wave of local or distant origin that results from large-scale seafloor displacements associated with large earthquakes, major sea-floor slides, or exploding volcanic islands.

Urban Interface That line, area, or zone where structures and other human development meets or intermingles with undeveloped wildland or vegetative fuels.

Wildfire An uncontrolled fire, usually spreading through vegetative fuels but often consuming structures as well.

Wildland An area in which development is essentially non-existent, except for roads, railroads, powerlines, and similar transportation facilities. Structures, if any, are widely scattered and are primarily for recreational purposes.

7.0 BIBLIOGRAPHY

Planning/Planning for Seismic Hazards

California Seismic Safety Commission, 1993. *The Commercial Property Owner's Guide to Earthquake Safety.*

California Seismic Safety Commission, 1994. *The Homeowner's Guide to Earthquake Safety.*

California Seismic Safety Commission, 1994. *California at Risk: Reducing Earthquake Hazards 1992-1996,* Report No. 94-01.

County of Ventura, 1995. *Hazard Mitigation Grant Program Subgrantee Application.*

Jones, L. and Perry-Huston, S., 1994. *Living with Earthquakes in Southern California,* unpublished article, U.S. Geological Survey.

Leighton & Associates, 1974. *City of Thousand Oaks, Seismic Safety Element - Part 1,* Thousand Oaks General Plan.

Nichols, D.R. and Buchanan-Banks, J.M., 1974. *Seismic Hazards and Land-Use Planning,* Geological Survey Circular 690.

Perliter & Ingalsbe Consulting Engineers, 1985. *Analyses of Steel Reservoirs for Earthquake Safety, Engineering Report.*

Seismicity and Regional Tectonics

American Petroleum Institute, 1987. *Recommended Practice for Planning, Designing and Constructing Fixed Offshore Platforms*, API Recommended Practice 2A (RP2A), Seventeenth Edition, April 1, 1987

Blake, T.F., 1991. *Synopsis of the Character and Recency of Faulting Along the Simi-Santa Rosa Fault System*, in: Engineering Geology Along the Simi-Santa Rosa Fault System and Adjacent Areas, Simi Valley to Camarillo; Association of Engineering Geologists, Southern California Section, 1991 Field Trip.

Boore, D.M., Joyner, W.B., and Fumal, T.E., 1993. *Estimation of Response Spectra and Peak Accelerations from Western North American Earthquakes: An Interim Report*, U.S. Geological Survey, Part 1, Open File Report 93-509, 72p; and Part 2, Open File Report 94-127, 40p.

Campbell, K.W., 1981. *Near Source Attenuation of Peak Horizontal Acceleration*, Bulletin of the Seismological Society of America, Vol. 71, No. 6, pp. 2039-2070, December 1981.

Campbell, K.W., 1985. *Strong Motion Attenuation Relations: A Ten-Year Perspective*, Earthquake Spectra, Vol. 1, No. 4, August, 1985.

Davis, T. and Namson, J., 1991. *Cross Section of the Western Santa Monica Mountains to the San Andreas Fault*, in: Engineering Geology Along the Simi-Santa Rosa Fault System and Adjacent Areas, Simi Valley to Camarillo; Association of Engineering Geologists, Southern California Section, 1991 Field Trip.

Dolan, J.F. et al, 1995. *Prospects for Larger for More Frequent Earthquakes in the Los Angeles Metropolitan Region*, Science, Vol. 267, 13 January 1995., pp. 199-205

Earthquake Engineering Research Center, 1994. *Preliminary Report on the Principal Geotechnical Aspects of the January 17, 1994 Northridge Earthquake*, University of California at Berkeley, Report No. UCB/EERC-94/08, June

Evernden, J.F. and Thomson, J.M., 1985. *Predicting Seismic Intensities*, in: Evaluating Earthquake Hazards in the Los Angeles Region-An Earth Science Perspective, U.S. Geological Survey Professional Paper 1360.

Evernden, J.F. and Thomson, J.M., 1988. *Predictive Model for Important Ground Motion Parameters Associated with Large and Great Earthquakes*, U.S. Geological Survey Bulletin 1838.

Hauksson, E., Jones, L.M., and Hutton, K., 1995. *The 1994 Northridge Earthquake Sequence in California: Seismological and Tectonic Aspects*, Journal of Geophysical Research, Vol. 100, No. B7, PP. 12,335-12,355, July 10, 1995.

Idriss, I.M., 1985. *Evaluating Seismic Risk in Engineering Practice*

Irvine, P.J., 1991. *An Overview of Slope Stability in the Simi Valley Area*, in: Engineering Geology Along the Simi-Santa Rosa Fault System and Adjacent Areas, Simi Valley to Camarillo; Association of Engineering Geologists, Southern California Section, 1991 Field Trip.

Jennings, C.S., 1994. *Fault Activity Map of California and Adjacent Areas*, California Division of Mines and Geology, Geologic Data Map Series, Map No. 6.

Krinitsky, E.L. and Chang, F.K., 1977. *State-of-the-Art for Assessing Earthquake Hazards in the United States*, Miscellaneous Paper S-73-1, Report 7, Specifying Peak Motions for Design Earthquakes, U.S. Army Engineer Waterways Experiment Station.

Los Angeles Times Article, May 20, 1994. *30-Mile Earthquake Fault Suspected Beneath Thousand Oaks,* Los Angeles Times, Ventura County West edition.

Petersen, M.D. and Wesnousky, S.G., 1994. *Fault Slip Rates and Earthquakes Histories for Active Faults in Southern California*, Bulletin of the Seismological Society of America, Vol. 84, No. 5, pp. 1608-1649.

Real, C.R., Toppozoda, T.R., and Parke, D.L., 1978. *Earthquake Epicenter Map of California Showing Events from 1900 through 1974 Equal to or Greater than Magnitude 4.0 or Intensity V*, Map Sheet 39.

Schnabel, P.B. & Seed, H.B., 1972, *Acceleration in Rock for Earthquakes in the Western United States,* Earthquake Engineering Research Center report No. 72-2, Univ. of California, Berkeley.

Jackson, D.D. et al, 1995. *Seismic Hazards in Southern California: Probable Earthquakes, 1994-2024*, Southern California Earthquake Center Working Group on California Earthquake Probabilities, Bulletin of the Seismological Society of America, Vol. 85, No. 2, April, pp. 379-439.

Tinsley, J.C. et al, 1985. *Evaluating Liquefaction Potential*, in: Evaluating Earthquake Hazards in the Los Angeles Region-An Earth Science Perspective, U.S. Geological Survey Professional Paper 1360.

U.S. Geological Survey, 1987. *Recent Reverse Faulting in the Transverse Ranges, California,* Professional Paper 1339.

U.S. Geological Survey and Southern California Earthquake Center, 1994. *The Magnitude 6.7 Northridge, California, Earthquake of 17 January 1994*, Science, Vol. 266, 21 October, 1994, pp. 289-397.

Wells, D.L. and Coppersmith, K.J., 1993. *Updated Empirical Relationships Among Magnitude, Rupture Length, Rupture Area, and Surface Displacement*, report submitted to the Seismological Society of America by Geomatrix Consultants, March 1993.

Wesnousky, S.G., 1986. *Earthquakes, Quaternary, Faults, and Seismic Hazard in California*, Journal of Geophysical Research, Vol. 91, No. B12, PP. 12,587-12631, Nov. 10, 1986.

Yeats, R.S., 1988. *Late Quaternary Slip Rate on the Oak Ridge Fault, Transverse Ranges, California: Implications for Seismic Risk*, Journal of Geophysical Research, Vol. 93, No. B10, October 10, 1988, pp. 12,137-12,149.

Yeats, R.S., Huftile, and Stitt, L.T., 1994. *Late Cenozoic Tectonics of the East Ventura Basin, Transverse Ranges, California*, American Association of Petroleum Geologists, Vol. 78, No. 7, July 1994, pp. 1040-1074.

Yeats, R.S. and Huftile, G.J., 1995. *The Oak Ridge Fault System and the 1994 Northridge*

Earthquake, Nature, Vol. 373, 2 February, 1995, pp. 418-420.

Youd, T.L., ASCE, M., and Perkins, D.M., 1978. *Mapping Liquefaction-Induced Ground Failure Potential*, Journal of Geotechnical Engineering Division, April 1978.

Ziony, J.I., ed., 1985. *Evaluating Earthquake Hazards in the Los Angeles Region-An Earth Science Perspective*, U.S. Geological Survey Professional Paper 1360.

Ziony, J.I., and Yerkes, 1985. *Evaluating Earthquake and Surface -Faulting Potential*, in: Evaluating Earthquake Hazards in the Los Angeles Region-An Earth Science Perspective, U.S. Geological Survey Professional Paper 1360.

Area Geology

City of Thousand Oaks, 1979. *Final Environmental Impact Report, Tract 2828/HPD-77-12, Kevington Hills, Ltd.*, prepared by City of Thousand Oaks Planning Department.

Diblee, T.W. and Ehrenspeck, H.E., 1990. *Geologic Map of the Camarillo and Newbury Park Quadrangles, Ventura County, California*, Diblee Foundation Map #DF-28.

Diblee, T.W. and Ehrenspeck, H.E., 1993. *Geologic Map of the Thousand Oaks Area, Los Angeles and Ventura Counties, California*, Diblee Foundation Map #49.

Ehlert, K.W., 1994. *Report of Geological Investigation, Vesting Tentative Tract 4831, City of Thousand Oaks, Ventura County, California,* April 14, 1994, report prepared for Arrow Engineering.

Envicom Corporation, 1994. *Response to Comments Document and Addendum No.301, Dos Vientos Ranch, Vesting Tentative Tract No. 4831*, June 27, 1994.

Jennings, C.W. and Strand, R.G., 1969. *Geologic Map of California, Los Angeles Sheet*, California Division of Mines and Geology, Scale 1:250,000.

Weber, F.H., 1973. *Geology and Mineral Resources Study of Southern Ventura County, California*, California Division of Mines and Geology, Preliminary Report 14.

Weber, F.H., 1984. *Geology of the Calabasas-Agoura-Eastern Thousand Oaks Area, Los Angeles and Ventura Counties, California*, California Division of Mines and Geology, Open-file Report 84-1 LA.

Yerkes, R.F., 1991. *Preliminary Geologic Map of the Thousand Oaks 7.5' Quadrangle, Southern California,* in: Engineering Geology Along the Simi-Santa Rosa Fault System and Adjacent Areas, Simi Valley to Camarillo; Association of Engineering Geologists, Southern

California Section, 1991 Field Trip.

Soils and Slope Stability

U.S. Soil Conservation Service, 1970. *Soil Survey of the Ventura Area*, U.S. Department of Agriculture.

Leighton, F.B. *Landslides and Urban Development*, in: Engineering Geology in Southern California, Association of Engineering Geologists Special Publication.

Weber, F.H. and Wills, C.J., 1983. *Map Showing Landslides of the Central and Western Santa Monica Mountains, Los Angeles and Ventura Counties, California*, California Division of Mines and Geology Open File Report 83-16.

Groundwater and Flooding

California Department of Water Resources, 1974. *Wood Ranch Dam, Final Inundation Map*, dated April 11, 1974.

California Department of Water Resources, 1976a. *Westlake Reservoir Dam, Final Inundation Map*, dated February 2, 1976.

California Department of Water Resources, 1976b. *Lake Sherwood Dam, Final Inundation Map*, dated February 2, 1976.

California Department of Water Resources, 1995. *Statutes and Regulation Pertaining to Supervision of Dams and Reservoirs*, Division of Safety of Dams.

Clearpoint Engineering, 1994. *Deficiency Study, Arroyo Conejo, Erbes Road Drain, and Thousand Oaks North Drain.*

Federal Emergency Management Agency, 1983. Flood Insurance Rate Map, City of Thousand Oaks, California.

French, J.J., 1980. *Ground Water in the Thousand Oaks Area, Ventura County, California*, U.S. Geological Survey, Water-Resources Investigation 80-63.

Hawks and Associates, 1992. *City of thousand Oaks, Master Plan of Drainage*.

Jensen Engineering, 1975. *Inundation Study for Lake Sherwood*

Kennedy/Jenks/Chilton Consulting Engineers and Scientists, 1992. *Final Report, Feasibility Study of Groundwater, Utilization for Nonpotable Water Demands*, report no. K/J 894608.00

Koebig and Koebig, Inc., 1974. *Master Drainage Study, Proposed Drainage Facilities Plan for Conejo Valley, Flood Zone III*, June 1974; adopted by the City Council November 19, 1974.

Michael Brandman Associates, 1994. *Final Environmental Impact Report, Lang Ranch Retention and Debris Basin, Residential Planned Development Permit RPD 94-457,*December 1994.

Perliter & Ingalsbe Consulting Engineers, 1973. *Data to accompany Inundation Maps - Wood Ranch Dam (Lake Bard Reservoir), Owner-Calleguas Municipal Water District, Thousand Oaks, California.*

Ventura County General Plan, 1994. *Ventura County General Plan, Hazards Index*, Adopted May 24, 1988; Amended July 12, 1994.

Ventura County Public Works Agency, 1986. *Quadrennial Report of Hydrologic Data, 1980-84.*

Ventura County Public Works Agency, 1994. *Groundwater Conditions Report, 1985-90.*

<u>Plans, Ordinances and Guidelines</u>

California Seismic Safety Commission, *Model Ordinance, Chapter 88 (1), Earthquake Hazard Reduction if Existing Buildings.*

City of Agoura Hills, 1992. *Emergency Operations Plan.*

City of Thousand Oaks, *Development Processing Policy and Procedure Manual, Final Copy,* undated.

City of Thousand Oaks, brochure: *Grading in the City of Thousand Oaks*, undated.

City of Thousand Oaks, *Emergency Operations Plan*, undated.

City of Thousand Oaks, August 1995. Thousand Oaks Municipal Code.

Department of Conservation, 1990. *Seismic Hazards Mapping Act of 1990*, State Mining and Geology Board.

Fisher, J.E., 1994. *Proposed Ventura County Geologic Hazards Ordinance*, Ventura County Board of Supervisors.

Hart, E.W., 1994. *Fault-Rupture Hazard Zones in California*, California Division of Mines and Geology, Special Publication 42.

Herman, F., Russell, J., Scott, S., and Sharpe, R., 1990. *Earthquake Hazard Identification and Voluntary Mitigation: Palo Alto's City Ordinance*, California Seismic Safety Commission Report No. SSC 90-05.

Leighton & Associates, 1995. *Safety Element for the City of Santa Monica General Plan*, Project No. 2910399-01, dated January.

Ventura County, 1989. *Ventura County Hazardous Material Response Plan*, revised January 1985.

Other

Calleguas Municipal Water District, 1988. *Potable Water Distribution Facilities*, maps dated January through March 1988.

California Water Service Company, 1995. *Water System of Westlake*, zone map dated January 15, 1995.

Crosby, B., 1992. *Our Wild Fire*, June 1992 article in Sunset Magazine, distributed by the Ventura County Fire Department.

Fulton, W., 1995. *Burn California, Burn,* Planning, Vol. 61, No. 6, June 1995, pp. 5-8.

Gilmer, M., 1994. *Wildfire Landscaping, Preparing for the Coming Trend in Defensible Space Homesites*, October 1994 article in Pacific Coast Nurseryman and Garden Supply Dealer, distributed by the Ventura County Fire Department.

Shell Oil Company. *Map of 10" Ventura Crude Line (y-1630), Record #3727, Log #16, Nov-93, TG# 526, 527*, undated.

Southern California Gas Company. Map of distribution lines in the Thousand Oaks area, untitled and undated.

Ventura County Fire Department, undated. *Commitment to Defense, Protect Your Home Against Wildfire.*

Ventura County Fire Protection District, undated. *Wildland Fire Unit, in Pursuit of Consistency.*

Appendix - Applicable California Code Sections

Historical and Statutory Notes

1982 Legislation.

Former § 65302.3 was repealed by its own terms on Jan. 1, 1984.

1984 Legislation

Legislative intent relating to Stats.1984, c. 1009, see note under Educ.C. § 39002.

§ 65302.4. Repealed by Stats.1984, c. 1009, § 5.7

Historical and Statutory Notes

See, now, § 65360.

§ 65302.5. Safety element in general plan; counties with state responsibility areas; compliance requirements

With respect to the safety element required in the general plan, pursuant to subdivision (g) of Section 65302, each county which contains state responsibility areas, as determined pursuant to Section 4125 of the Public Resources Code, shall comply with Section 4128.5 of the Public Resources Code.

(Added by Stats.1989, c. 778, § 1.)

Historical and Statutory Notes

1989 Legislation

Former § 65302.5 was repealed by Stats.1984, c. 1009, § 6. See, now, § 65360.

§§ 65302.6, 65302.7. Repealed by Stats.1984, c. 1009, §§ 7, 7.5

Historical and Statutory Notes

See, now, §§ 65361, 65362.

§ 65302.8. Adoption or amendment of general plan element operating to limit number of housing units; findings

Law Review Commentaries

Growth control by the ballot box: California's experience. Daniel J. Curtin, Jr. and M. Thomas Jacobson, 24 Loy.L.A.L.Rev. 1073 (1991).

Transportation congestion and growth management: Comprehensive approaches to resolving America's major quality of life crisis. Robert H. Freilich and S. Mark White, 24 Loy.L.A.L.Rev. 915 (1991).

Notes of Decisions

In general 1

1. In general

Statutes [West's Ann.Cal.Gov.Code § 65302.8] governing adoption or amendment of general plan element operating to limit number of housing units did not apply to ordinance adopted pursuant to initiative measure which established development allotment system whereby only 100 net dwelling units would be permitted each year for ten-year period, where ordinance was not amendment to city's general plan. Lee v. City of Monterey Park (App. 2 Dist. 1985) 219 Cal.Rptr. 309, 173 Cal.App.3d 798, review denied.

§ 65302.9. Local ordinances or regulations governing occasional commercial filming on location; limitations; effect of other ordinances and regulations of the jurisdiction

(a) A city or county may adopt an ordinance or other regulation governing the issuance of permits to engage in the use of property for occasional commercial filming on location. This section shall not limit the discretion of a city or county to limit, condition, or deny the use of property for occasional commercial filming on location to protect the public health, safety, or welfare.

(b) All ordinances and regulations enacted by a city or county regulating by permit the use of property for occasional commercial filming on location shall not be subject to zoning ordinances or other land use regulations of that jurisdiction unless the filming ordinance or regulation expressly states that it is subject to, or governed by, those zoning ordinances or other land use regulations.

(2) A seismologist.

(3) A civil engineer registered in the state.

(4) A structural engineer registered in the state.

(5) A representative of city government, selected from a list submitted by the League of California Cities.

(6) A representative of county government, selected from a list submitted by the County Supervisors Association of California.

(7) A representative of regional government, selected from a list submitted by the Council of Governments.

(8) A representative of the insurance industry.

(9) The Insurance Commissioner.

All of the members of the advisory committee shall have expertise in the field of seismic hazards or seismic safety.

(c) At least 90 days prior to adopting measures pursuant to this section, the board shall transmit or cause to be transmitted a draft of those measures to affected cities, counties, and state agencies for review and comment.

(Added by Stats.1990, c. 1168 (A.B.3897), § 3, operative April 1, 1991. Amended by Stats.1991, c. 104 (S.B.125), § 13, eff. July 2, 1991; Stats.1992, c. 999 (A.B.2943), § 11.)

§ 2696. Maps; compilation; submission; notice

(a) The State Geologist shall compile maps identifying seismic hazard zones, consistent with the requirements of Section 2695. The maps shall be compiled in accordance with a time schedule developed by the * * * director and based upon the provisions of Section 2695 and the level of funding available to implement this chapter.

(b) The State Geologist shall, upon completion, submit seismic hazard maps compiled pursuant to subdivision (a) to the board and all affected cities, counties, and state agencies for review and comment. Concerned jurisdictions and agencies shall submit all comments to the board for review and consideration within 90 days. Within 90 days of board review, the State Geologist shall revise the maps, as appropriate, and shall provide copies of the official maps to each state agency, city, or county, including the county recorder, having jurisdiction over lands containing an area of seismic hazard. The county recorder shall record all information transmitted as part of the public record.

(c) In order to ensure that sellers of real property and their agents are adequately informed, any county that receives an official map pursuant to this section shall post a notice within five days of receipt of the map at the office of the county recorder, county assessor, and county planning commission, identifying the location of the map and the effective date of the notice.

(Added by Stats.1990, c. 1168 (A.B.3897), § 3, operative April 1, 1991. Amended by Stats.1992, c. 999 (A.B.2943), § 12.)

§ 2697. Geotechnical reports; waiver or approval; submission of copies

(a) Cities and counties shall require, prior to the approval of a project located in a seismic hazard zone, a geotechnical report defining and delineating any seismic hazard. If the city or county finds that no undue hazard of this kind exists, based on information resulting from studies conducted on sites in the immediate vicinity of the project and of similar soil composition to the project site, the geotechnical report may be waived. After a report has been approved or a waiver granted, subsequent geotechnical reports shall not be required, provided that new geologic datum, or data, warranting further investigation is not recorded. Each city and county shall submit one copy of each approved geotechnical report, including the mitigation measures, if any, that are to be taken, to the State Geologist within 30 days of its approval of the report.

(b) In meeting the requirements of this section, cities and counties shall consider the policies and criteria established pursuant to this chapter. If a project's approval is not in accordance with the policies and criteria, the city or county shall explain the reasons for the differences in writing to the State Geologist, within 30 days of the project's approval.

(Added by Stats.1990, c. 1168 (A.B.3897), § 3, operative April 1, 1991.)

§ 2698. Stricter city or county policies and criteria

Nothing in this chapter is intended to prevent cities and counties from establishing policies and criteria which are more strict than those established by the board.

(Added by Stats.1990, c. 1168 (A.B.3897), § 3, operative April 1, 1991.)

§ 2699. Preparation of safety element in general plan; ordinances; use of map information

Each city and county, in preparing the safety element to its general plan pursuant to subdivision (g) of Section 65302 of the Government Code, and in adopting or revising land use planning and permitting ordinances, shall take into account the information provided in available seismic hazard maps.

(Added by Stats.1990, c. 1168 (A.B.3897), § 3, operative April 1, 1991.)

§ 2699.5. Seismic hazards identification fund; transfer of deposits

(a) There is hereby created the Seismic Hazards Identification Fund, as a special fund in the State Treasury. Notwithstanding Section 13340 of the Government Code, the moneys in the fund are continuously appropriated to the division for the purposes of this chapter.

(b) Notwithstanding Section 5001 of the Insurance Code, one-half of 1 percent of the earthquake surcharge moneys * * * received by the California Residential Earthquake Recovery Fund in any calendar year shall be transferred to the Seismic Hazards Identification Fund for the purposes of carrying out this chapter. This subdivision shall become operative only if Assembly Bill 3913 [1] or Senate Bill 2902 [2] of the 1989–90 Regular Session of the Legislature is enacted and takes effect.

(Added by Stats.1990, c. 1168 (A.B.3897), § 3, operative April 1, 1991. Amended by Stats.1991, c. 104 (S.B.125), § 14, eff. July 2, 1991.)

1 Not enacted.

2 Stats.1990, c. 1165.

§ 2699.6. Operative date of chapter

This chapter shall become operative on April 1, 1991.

(Formerly § 2599.6, added by Stats.1990, c. 1168 (A.B.3897), § 3, operative April 1, 1991. Renumbered § 2699.6 and amended by Stats.1991, c. 1091 (A.B.1487), § 126.)

Chapter 8

STRONG–MOTION INSTRUMENTATION PROGRAM

§ 2703. Maintenance and service of instruments; assistance to construction industry

The division shall * * * maintain and service the strong-motion instruments installed, * * * shall * * * collect and interpret all records from the instruments, and shall make the records, record interpretations, and technical assistance available to the construction industry.

(Amended by Stats.1987, c. 783, § 2.)

Historical and Statutory Notes

1987 Legislation

Sections 1 and 5 of Stats.1987, c. 783, provide:

"Section 1. The Legislature finds and declares all of the following:

"(a) Earthquakes will continue to occur in California. There is a 50 percent chance that a major damaging earthquake will occur within the next 20 years. Smaller damaging earthquakes occur more often.

"(b) The motion of buildings and other structures cannot be understood completely without actual measurements of real buildings and other structures during earthquakes.

"(c) Under the strong-motion instrumentation program, strong-motion instruments are installed in buildings, transportation structures, dams, and other critical lifeline

§ 4102. State responsibility areas

Notes of Decisions

In general 1

---

1. In general

The phrase "direct cost of fire protection" as used in § 4132 refers to that amount which the board of forestry determines, from the state's perspective in conformity with its plan for statewide fire protection, would be necessary, directly attributable, and reasonably allocable to provide the established level of fire protection for the particular types of land in the state responsibility areas within a county; calculation of that amount would include monies that would be so allocated for capital improvements, equipment purchases and fire prevention activities for those areas but would not include expenditures for administrative overhead. 66 Ops.Atty.Gen. 512, 12–30–83.

§ 4103.4. Open fire

"Open fire" means any fire, controlled or uncontrolled, including a campfire, burning outside of any structure, mobilehome, or living accommodation mounted on a motor vehicle. "Open fire" does not include portable lanterns designed to emit light resulting from a combustion process.

(Added by Stats.1988, c. 270, § 1.)

§ 4103.5. Campfire

"Campfire" means a fire which is used for cooking, personal warmth, lighting, ceremonial, or aesthetic purposes, including fires contained within outdoor fireplaces and enclosed stoves with flues or chimneys, stoves using jellied, liquid, solid, or gaseous fuels, portable barbecue pits and braziers, or space heating devices which are used outside any structure, mobilehome, or living accommodation mounted on a motor vehicle. "Campfire" does not include portable lanterns designed to emit light resulting from a combustion process.

(Amended by Stats.1988, c. 270, § 2.)

Article 2

GENERAL PROVISIONS

§ 4112. Administrative districts; supervising forest officers, appointment

Notes of Decisions

In general 1

---

1. In general

The phrase "direct cost of fire protection" as used in § 4132 refers to that amount which the board of forestry determines, from the state's perspective in conformity with its plan for statewide fire protection, would be necessary, directly attributable, and reasonably allocable to provide the established level of fire protection for the particular types of land in the state responsibility areas within a county; calculation of that amount would include monies that would be so allocated for capital improvements, equipment purchases and fire prevention activities for those areas but would not include expenditures for administrative overhead. 66 Ops.Atty.Gen. 512, 12–30–83.

§ 4113. Duties of supervising forest officers

Notes of Decisions

In general 1

---

1. In general

The phrase "direct cost of fire protection" as used in § 4132 refers to that amount which the board of forestry determines, from the state's perspective in conformity with its plan for statewide fire protection, would be necessary, directly attributable, and reasonably allocable to provide the established level of fire protection for the particular types of land in the state responsibility areas within a county; calculation of that amount would include monies that would be so allocated for capital improvements, equipment purchases and fire prevention activities for those areas but would not include expenditures for administrative overhead. 66 Ops.Atty.Gen. 512, 12–30–83.

Cross References

State responsibility areas defined, see § 4102.
Territory subject to organization as a district pursuant to Fire Protection District Law of 1961, see Health & S.C. § 13821.

§ 4125. State responsibility areas, classification by Board

The board shall classify all lands within the state, without regard to any classification of lands made by or for any federal agency or purpose, for the purpose of determining areas in which the financial responsibility of preventing and suppressing fires is primarily the responsibility of the state. The prevention and suppression of fires in all areas which are not so classified is primarily the responsibility of local or federal agencies, as the case may be.

(Added by Stats.1965, c. 1144, p. 2831, § 9.6.)

Historical Note

See Historical Note, Derivation List, and Disposition Table following Division analysis preceding § 4000.

Derivation: Former § 4000.2, added by Stats.1945, c. 904, p. 1687, § 1.

Cross References

State responsibility areas, application of this section, see § 4102.

Administrative Code References

Rules and regulations, see 14 Cal.Adm. Code 1220 et seq.

Library References

Fires ⇐8, 9.
Woods and Forests ⇐5.

C.J.S. Fires §§ 15, 16, 17, 18.
C.J.S. Woods and Forests § 5.

Notes of Decisions

In general 1
Preemption 2
Standby charges 3

---

1. In general

A fire protection district must be appointed by the state forester as his representative in order to issue burning permits in state responsibility areas. 55 Ops.Atty. Gen. 45, 1–21–72.

Landowner has duty to control and extinguish fire on his property without state compensation, but by prior contract, state forester may employ landowner and his equipment to control a conflagration. 28 Ops.Atty.Gen. 227.

2. Preemption

Authority of county to regulate fire prevention practices is restricted to areas not preempted by state regulations. 28 Ops. Atty.Gen. 190.

3. Standby charges

A local agency may impose a standby charge for fire suppression services on lands that have been classified pursuant to this section as "state responsibility areas," if the charge imposed does not exceed the value of the services made available. 64 Ops.Atty.Gen. 570, 7–8–81.